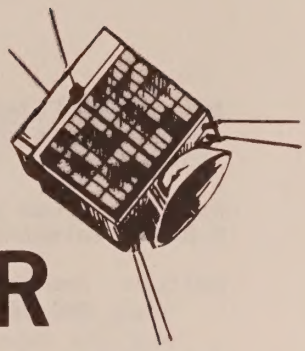
AMSAT™ NEWSLETTER



Publications Contest Winner 1977

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Copy Deadline for next issue is 1 Aug. 1978

COVER PICTURE

The OSCAR poster now available from ARRL Headquarters is shown by the lovely Nòrma Moran who used to type the Newsletter.

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BACK ISSUES AVAILABLE

Back issues of the Newsletter are available upon request in return for a donation to AMSAT.

If you specify what year you first joined AMSAT, we'll send you an assortment of ten earlier issues for $10.00, or fifteen issues for $15.00.

Certain pre-1974 and the September 1975 issues are not available.

Note that due to the time and effort involved in servicing back issue requests, the minimum donation should be $10.00.

Write to Back Issues, AMSAT, P.O. Box 27, Washington, D.C., 20044.

INTRODUCING MARTHA -
AMSAT'S ADMINISTRATIVE ASSISTANT

If you've had occasion to telephone the AMSAT Washington office in the past several months and been greeted by a friendly female voice, then chances are you know of Martha Saragovitz, AMSAT's Administrative Assistant.

Martha joined AMSAT fulltime in January after ten years as a Supervising Teacher with the Head Start Program. She has helped significantly to reduce the burden of paperwork on AMSAT's volunteer and paid staff. Martha's responsibilities include handling the large volume of AMSAT mail, and processing of membership renewals, life memberships and follow-up notices. She also does most of the AMSAT bookkeeping and accounting, and also AMSAT typing, including the typing and distribution of AMSAT Newsletters.

A native of Washington where she has an apartment near Dupont Circle, Martha describes here interests this way:

"I enjoy the ballet, theatre, travel and reading. I hope to continue to use my background in education by doing volunteer work."

MAILING OF NEWSLETTERS

We hope everyone has been receiving their AMSAT Newsletters on time and in good shape. Unfortunately, with ever increasing postage costs, it now costs 73¢ to airmail a Newsletter to Europe or South America, and 86¢ to send one to Africa, Asia or the Pacific. By comparison, it only costs 1.6¢ to send one Newsletter to one of our members in the United States. Our postage bill for the March Newsletter was around $800, nearly all of which paid for our members overseas.

As a result of these escalating costs, the AMSAT Board is taking another look at whether we should revert to sea-mail for sending Newsletters overseas at a cost of about 4 to 5¢ per copy. For those preferring to receive their Newsletter by airmail, we would probably request a contribution of another $3 per year. This is now done with many other magazines.

Members are invited to comment on this proposal. Wouldn't $3,000 a year trimmed from our postage bill be better spent for Phase III spacecraft hardware?

AMSAT POSITION OPENINGS

AMSAT has openings beginning this summer for one fulltime aerospace engineer and one fulltime aerospace technician to work on the AMSAT Phase III spacecraft project. A good practical background in construction of electronic subsystems is required, including good mechanical design ability.

Assignment will be at the new AMSAT-OSCAR Spacecraft Laboratory at the Goddard Space Flight Center, with possible short-term assignments in support of AMSAT-Deutschland in Marburg, Germany and the Phase III-A launch team in Korou, French Guiana.

Please contact Perry Klein at AMSAT Headquarters if you know of someone qualified who might be interested.

TWO METER TRANSMITTER FILTER FOR MODE "J"

By Joe Reisert, W1JR
17 Mansfield Drive
Chelmsford, MA 01824

Many OSCAR 8 Mode J users have been experiencing receiving difficulties due to a large number of birdies appearing on the 435.1 - 435.2 MHz downlink when they are transmitting between 145.9 and 146 MHz on the uplink. This is most often due to overloading and intermodulation in the 70 cm converter due to the proximity of the third harmonic of the uplink transmitter (viz. 437.7 - 438 MHz).

There is very little that can be done to the receiving converter without using elaborate filters and high dynamic-range circuitry. However, most of the birdies can be eliminated by properly filtering the output of the two-meter transmitter to minimize any third harmonic output.

In my case, I could detect about a dozen such birdies varying from just above the noise to 20 - 30 dB over the noise. Operation on the 435.10 - 435.2 MHz downlink was almost impossible. Then I added a simple (see Figure 1) 5 element half-wavelength type of low-pass filter on the two-meter transmitter (a homebrew transistor amplifier operating class B with 40 watts maximum output). There was an immediate improvement with only two weak and three moderate (10 - 15 dB over the noise) birdies. Needless to say, the results were dramatic.

The filter used is not an ordinary low-pass type. It exhibits the characteristics of a 1 to 2 dB ripple Chebyshev design over the 135 - 150 MHz band. The cutoff frequency is typically 250 - 275 MHz, and attenuation is greater than 10 dB on the second harmonic (292 MHz) and greater than 50 dB at 438 MHz. Therefore, this design is only recommended for two-meter use.

Construction:

For optimum performance, the filter should be built into a shielded box as shown in Figure 2. Double-sided printed circuit board is recommended as a suitable ground plane and also makes soldering to C1 and C3 easier. Note that solder should flow on both edges of C1 and C3 for lowest loss and VSWR. Also provide a good ground strap between J1 and J2 to the top side of the printed circuit board as shown. This will further reduce harmonic output.

Operation:

Tuneup is simple since the filter has a broad bandpass. First set C2 to minimum capacitance and place the filter between the transmitter output and a power output or VSWR meter. With the transmitter tuned to 146.0 MHz, increase the capacitance of C2 until power output is maximum. Caution: do not exceed 50 watts output (more than enough for OSCAR 8 Mode J operation) since the components are not rated for higher power loads. Retuning for 144 MHz operation should not be necessary as the filter bandwidth is quite broad.

If you are fortunate enough to have access to a spectrum analyzer, you can tune C2 for minimum output at 438 MHz. This, however, may cause additional loss at 146 MHz. If so, the transmitter output circuit may be readjusted to compensate for the mismatch.

Performance:

The 435.1 to 435.2 MHz spectrum will be much cleaner when using the described filter on your two-meter transmitter. Always use the least possible transmitter power, since this will also lower the third harmonic level. Additional separation between the two-meter and 70 cm antenna should also help.

Figure 1

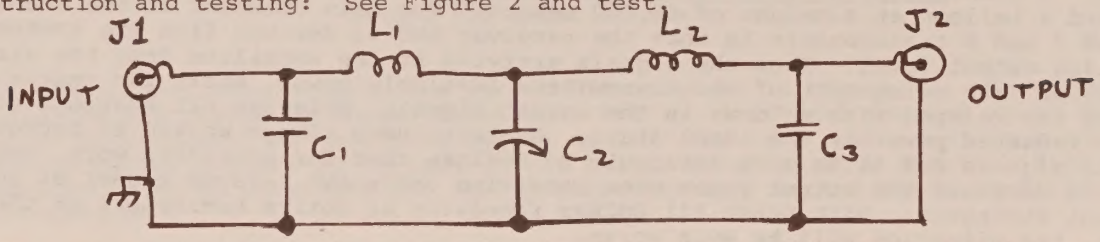
148 MHZ LOW PASS FILTER

Insertion loss at 144 - 148 MHz: Negligible.

Maximum input power: 50 watts.

Attenuation at 432 - 438 MHz: 50 dB typical.

Construction and testing: See Figure 2 and test.



C1, C2 - 22 pf low loss Mica 300 volt min. UNELCO type J101 (Note 1 and text).

C2 - 10 - 60 pf Mica trimmer with short leads - ARCO/ELMENCO type 404 (See text).

L1, L2 - 3T #14 Awg enameled copper wire close-wound, ¼" inside diameter (approx. 40 nanohenries).

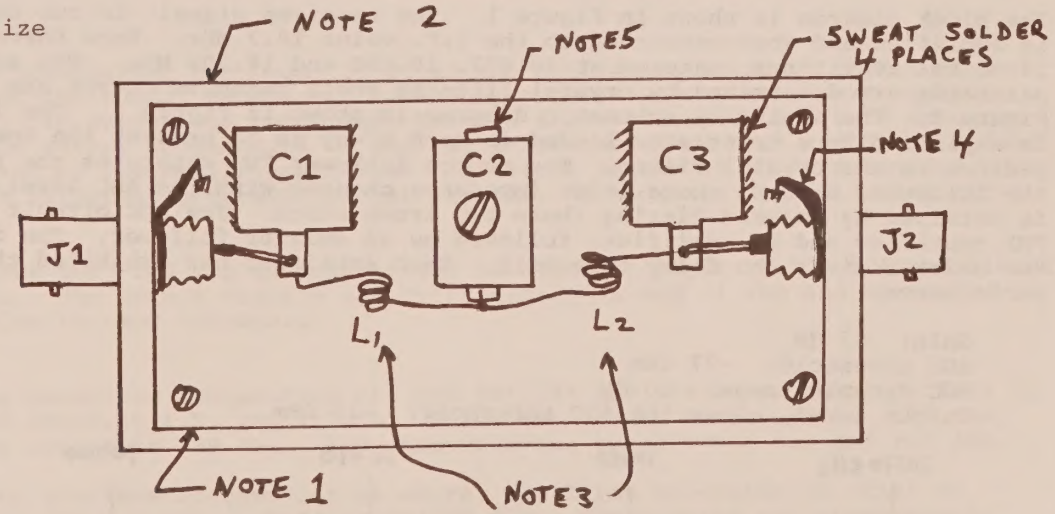
J1 J2 - Type BNC, UHF or N coax fittings.

Note 1: 22 pf UNELCO Mica capacitors are available from Webster Radio, 2602 E. Ashlan, Fresno, CA 93726 at $1.75 each plus tax and shipping. Do not substitute other types of capacitors.

Figure 2

RECOMMENDED LOW PASS FILTER CONSTRUCTION

Scale ≈2X Size



Notes:

1. Use double sided p.c. board bolted to box.
2. Shielded aluminum box is recommended, approximately 2½" X 1¼" X 1¼".
3. Keep L1 and L2 separated to cut down on possible mutual coupling.
4. Provide positive ground return such as a strap from connector ground to top side of p.c. board.
5. Keep leads on C2 as short as possible (see text).

A NEW TRANSPONDER FOR AMATEUR SATELLITES

By Piero Moroni, I5TDJ
Via Cosseria 10
50129 Firenze, Italy

FOREWORD

A group of amateurs, I5FLN, I5KRD, I5SXN and I5TDJ have designed and built a bread-board of a transponder which is an improvement over those now used aboard AMSAT-OSCAR 7 and 8. The Italian Amateur Radio Association (A.R.I.) has financed the work. A transponder of this type will be flown from Sicily to Spain this August aboard a balloon at a height of 40,000 meters. The main drawback of the AMSAT-OSCAR 7 and 8 transponders is that the receiver AGC is derived from the transmitting section output level. Thus the signals arriving at the satellite from the strongest stations are using most of the transmitter available power, while the weaker stations are relayed with a "down in the noise" signal. Relaying all stations at the same radiated power is the ideal state. Amateurs have always worked to improve their signals and it is very difficult to realize that for satellite work, one should decrease the output power when receiving one's own relayed signal at good signal strengths. With PHASE III OSCARs receiving an entire hemisphere at the same time, the situation will be even worse.

The new transponder uses this basic idea. If we divide the bandpass into a certain number of independent amplifiers, each one with its own AGC, a very strong station going through one amplifier will take the same amount of output power as a weak station going through the adjacent amplifier.

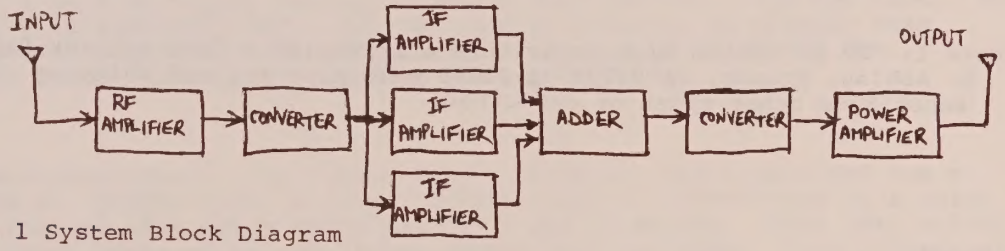


Figure 1 System Block Diagram

DESCRIPTION

The block diagram is shown in Figure 1. The received signal, in our case 144 MHz, is amplified and down-converted to the I.F. value 10.7 MHz. Here there are three identical amplifiers centered at 10.677, 10.688 and 10.700 MHz. The amplifier passbands are determined by crystal filters; their bandpass curves are shown in Figure 2. The amplifier schematic diagram is shown in Figure 3. The input signal is amplified by a transistor loaded in such a way as to present the specified impedance to the crystal filter. The source follower FET separates the filter from the following stages, whose input impedance changes with the AGC level. AGC action is obtained by forward biasing these two transistors. The AGC circuit employs a PNP rectifier and DC amplifier, followed by an emitter follower. The diode on the PNP emitter gives the delay threshold. Each amplifier has exhibited the following performance:

Gain: 67 dB
AGC threshold: -77 dBm
AGC dynamic range: 50 dB
Output level, above the AGC threshold: -10 dBm

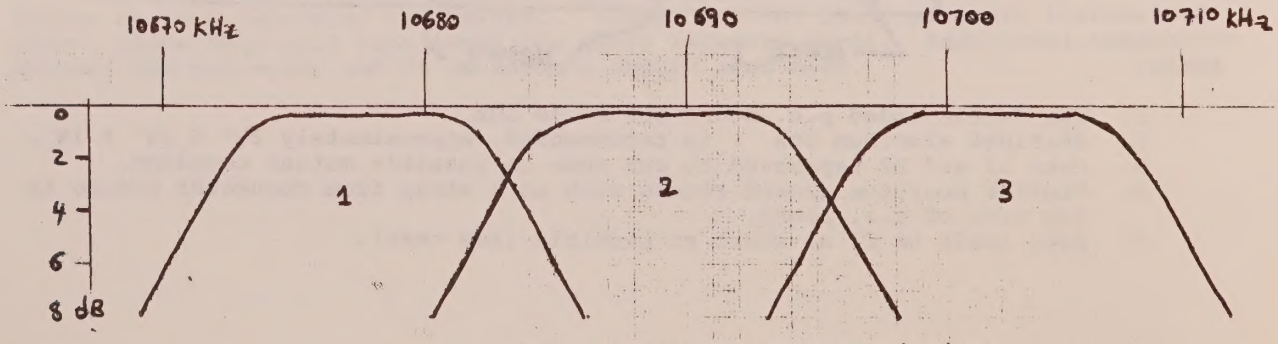


Fig. 2 Bandpass Characteristics

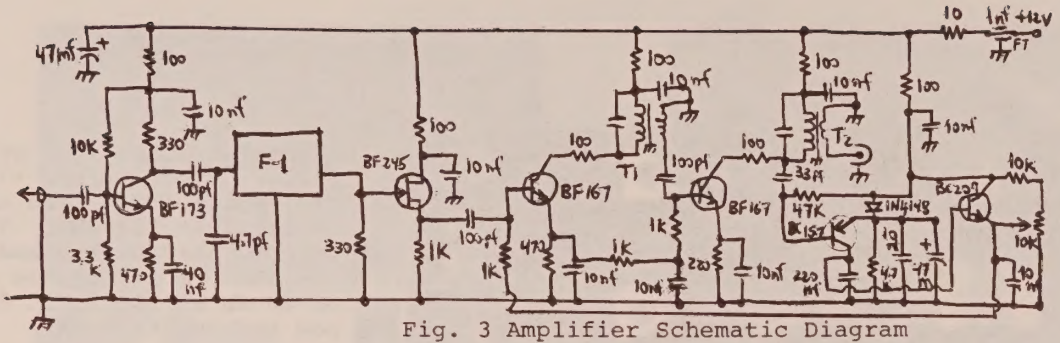


Fig. 3 Amplifier Schematic Diagram

The I.F. amplifier outputs go to the up-converter, shown in Figure 4. The three input signals are summed by three common gate FET's. A crystal controlled 18 MHz oscillator heterodynes the resulting signal to 28.7 MHz by a double-balanced mixer. The desired mixing product is separated by a double-tuned circuit and amplified by two transistors up to about 400 mW. The up-converter has demonstrated the following performance:

Gain: 32 dB
Output power: 400 mW

Figure 5 and 6 show photographs of the I.F. amplifiers and the up-converter, respectively.

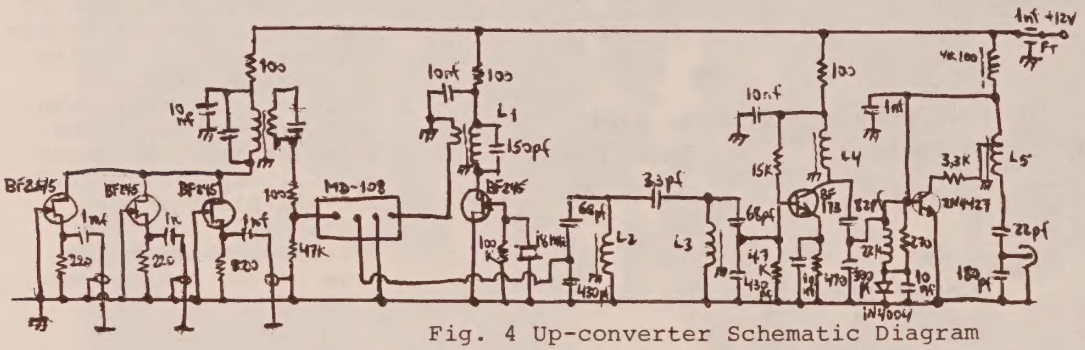


Fig. 4 Up-converter Schematic Diagram

PERFORMANCE

The complete transponder has been tested in the configuration shown in Figure 7. The outputs of two signal generators summed by a two-way combiner, were applied to the input; its output was connected, through a 30 dB attenuator, to a spectrum analyzer. The output frequencies of the two generators have been adjusted to fall in the passband of two amplifiers. Then the output levels of the transponder were recorded with different generator output signals, as shown in the following pictures.

Figure 8 Shows two -109 dBm signals at the transponder input at 144.174 and 144.211 MHz. The output signals are respectively +6 and +8 dBm and operation is below the AGC threshold.

Figure 9 The generator frequencies are now 144.184 and 144.2 MHz and they fall in two adjacent I.F. amplifiers. The first generator output is -109 dBm, the second is -99 dBm. The corresponding outputs are +13 and +20 dBm.

Figure 10 With the same frequencies as above, the first generator is still at -109 dBm and the second one at -79 dBm. The outputs are respectively +8 and +23 dBm. The input difference of 30 dB is reduced to 15 dB; the first amplifier AGC is not yet activated.

Figure 11 Same frequencies as above. Both generator outputs are -99 dBm, to have the AGC working in both amplifiers. The outputs are respectively +19 and +20 dBm. Third order intermodulation distortion products are about 30 dB below the PEP.

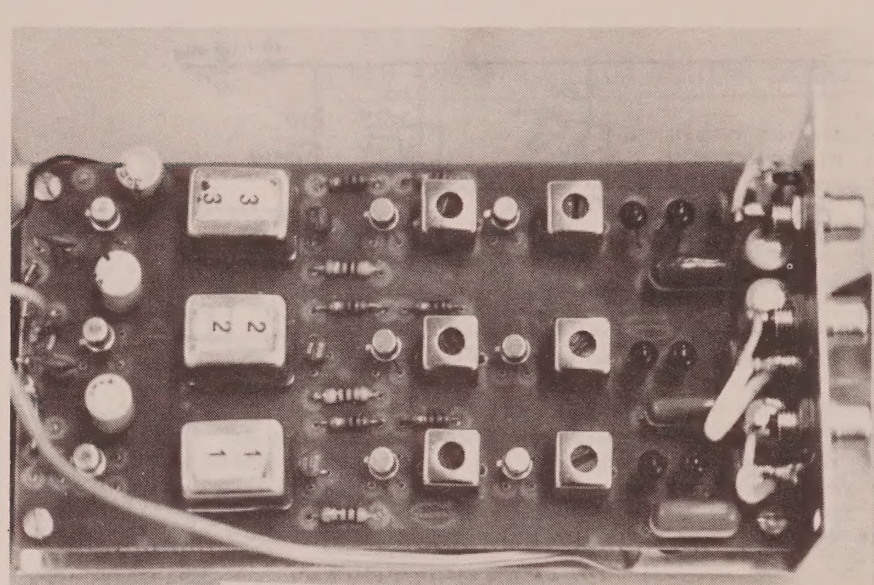


Fig. 5 3 Channel IF Strip

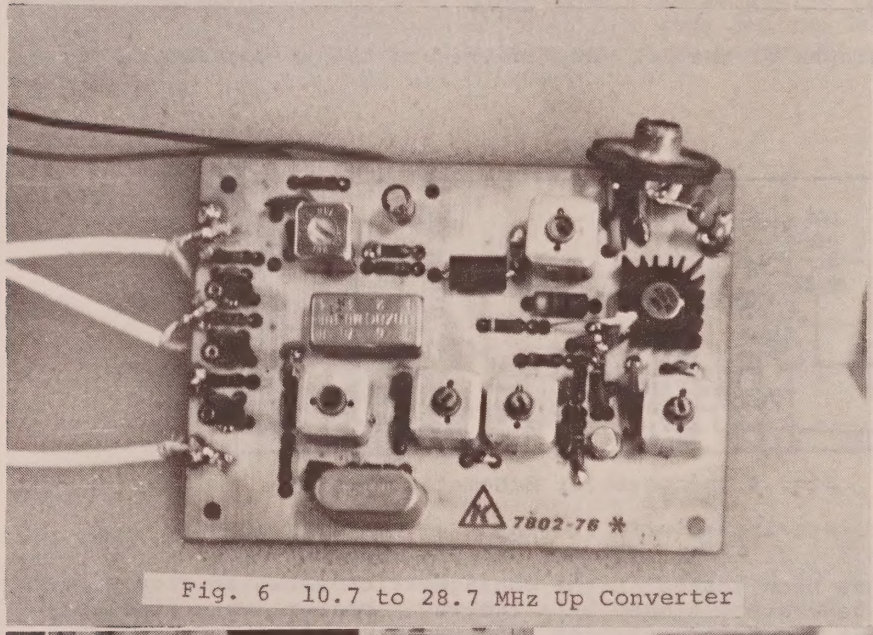


Fig. 6 10.7 to 28.7 MHz Up Converter

Figure 12 The first generator output is now -79 dBm, while the second one is still at -99 dBm. The outputs are now +20 and +16 dBm. A difference of 20 dB at the input is now reduced to 4 dB.

Figure 13 The first generator output is now -69 dBm and the second one is still at -99 dBm. The outputs are +18 and +11 dBm. Now a 30 dB difference at the input gives 7 dB of difference at the output.

CONCLUSION

We believe that a transponder using this principle could give improved performance over that of the existing OSCAR transponders. We would like to thank MISTRAL of Sermoneta (Latina), who built (at no cost) the adjacent bandpass crystal filters for the I.F., and ARX-Electronics (IW5AEU) of Scandicci (Firenze) who donated some of the components used in the circuits.

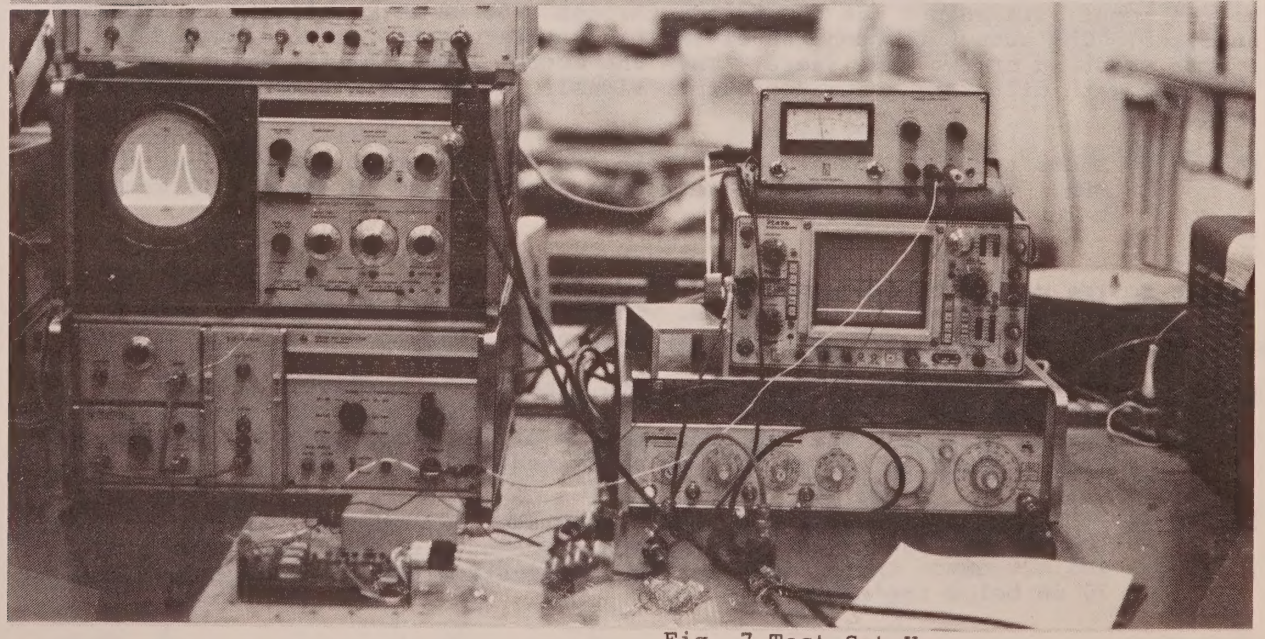


Fig. 7 Test Set Up

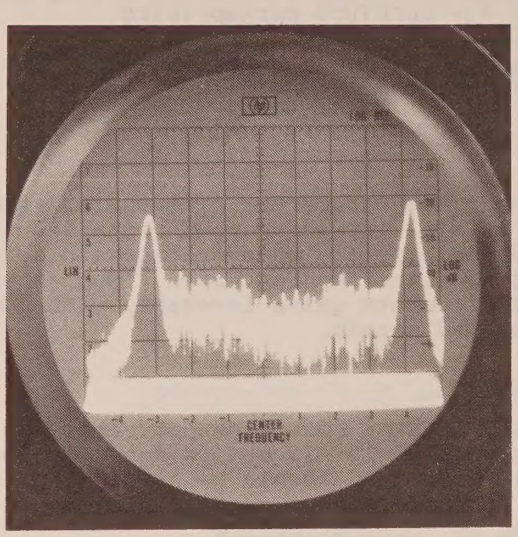


Figure 8

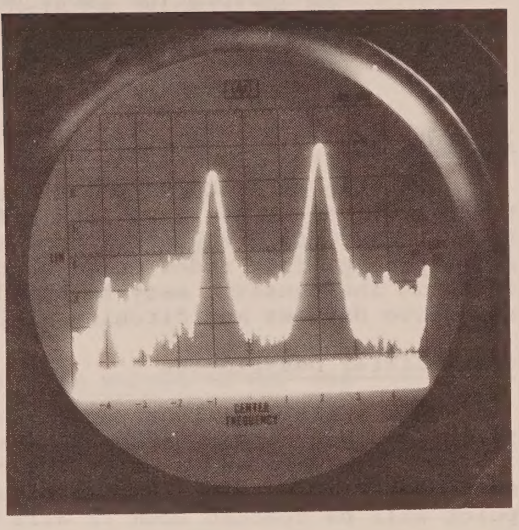


Figure 9

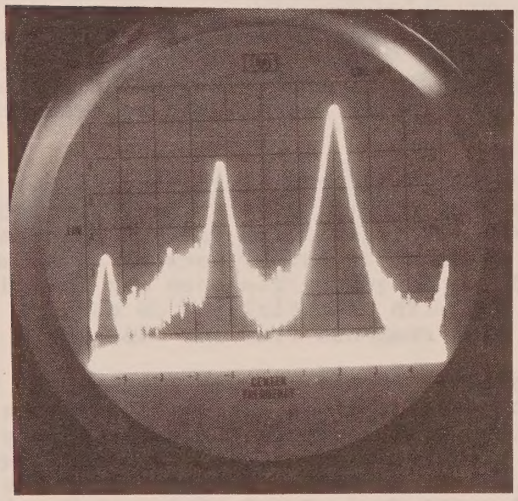


Figure 10

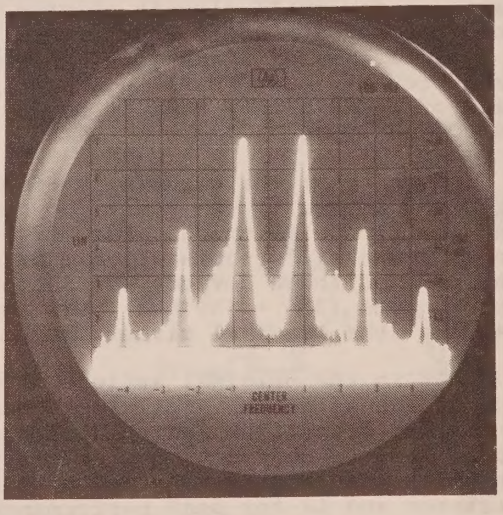


Figure 11

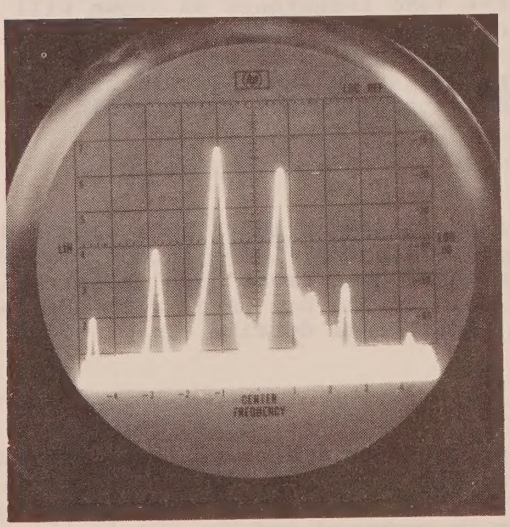


Figure 12

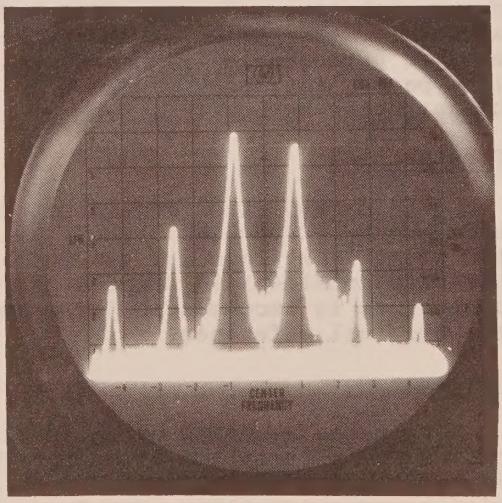


Figure 13

AN INEXPENSIVE AMSAT-OSCAR MODE "J" RECEIVER PREAMPLIFIER

By Joe Reisert, W1JR
17 Mansfield Drive
Chelmsford, MA 01824

Introduction

Now that AMSAT-OSCAR 8 has been launched, many users are discovering that their receiving converters lack sufficient sensitivity (have poor noise figures) to hear the Mode J signals. Most of this deficiency can be overcome with a low-noise preamplifier added ahead of the existing receiving converter. Such a unit, which is inexpensive, easy to build and will compete quite favorably with more expensive devices and circuits will be described herein.

Preamplifier Description

This article will not dwell on the AMSAT-OSCAR 8 Mode J output, etc. Suffice it to say that a reasonable 435 MHz antenna gain of 10 -15 dBd, a feedline loss of 2 - 3 dB maximum, and a noise figure of less than 3 dB should be sufficient for most operation. A lower noise figure will further improve performance, but a point will be reached when it will no longer be "cost-effective".

The preamplifier to be described is an inexpensive version of the "Ultra Low-noise UHF Preamplifier" (Ref. 1), a unit which has been used worldwide, especially on 70 CM EME. The original circuit used a $46.00 transistor which is no longer available but yielded a 1.25 dB typical noise figure with 15 - 16 dB gain. By making a few small circuit changes, a less expensive transistor can be used. The Motorola MRF 904 costs approximately $2.00 and in the modified circuit will yield a typical gain of 12 dB with a noise figure of 1.75 dB. The Motorola MRF 901 (and probably the BFR 91) now cost approximately $1.50 and will yield a typical gain of 14 dB with a similar noise figure. The latter device used to cost between $6.00 and $9.00.

Looking at the circuit in Figure 1, you will note the similarity to the original circuit; the zener diode biasing, hot carrier diode input protection and the simple matching. The MRF 901 and MRF 904 transistors did not require any input inductor for noise figure matching. By using an output network as shown, the gain on these devices was increased and the frequency response was shaped for a broad (350 - 450 MHz) peak response, but with essentially Ø dB gain at 144 MHz (the original circuit had almost a flat response from 20 - 450 MHz).

As in the original article, the preamplifier should be constructed with the components as shown. Failure to use the hot carrier diode (do not substitute germanium or silicon switching diodes) limiter will increase the noise figure and could lead to destruction from stray RF or electrical discharge. A simplified RF choke is also shown. The 5.0 pf output capacitor is tailored with the 20 ohm resistor and L2 for peak performance at 420 - 450 MHz and substitution of other values is not recommended if adequate gain and stability are to be attained.

Note the lead configuration on the MRF 901 and 904. Do not ground these devices with extremely short leads. The extra lead inductance as shown will improve stability and input VSWR and will be described in detail in a forthcoming article. Other transistors may be used, but the author will not guarantee similar performance. Don't forget the 0.1 mf bypass on the +12 volt line since it bypasses any stray RF (such as a local HF Kw transmitter) which could lead to catastrophic burnout.

Construction

The preamplifier should be built into a small (2½" X 1¾" X 1¼") shielded box such as the Pomona 2417 type. Since extremely low noise figure is not required, BNC coaxial fittings are usable but "UHF" or "RCA Phono Jacks" are undesirable. Use of a double-sided printed circuit board held to the box cover with the coax connectors is recommended for construction. Additional details are provided in the original reference.

Performance

From the response of those who have duplicated this preamplifier, the improvement in reception is overwhelming. Generally speaking, no additional filtering is required. However, if you live in a high RF environment such as UHF television transmitter etc., an input filter may be required and the one in the original article is recommended. Also, never use a power supply which also serves as a source supply for relays since the spikes can destroy the transistor.

One final note: If correspondence with the author is required, an SASE or IRC's with a minimum of questions would be appreciated if an answer is desired.

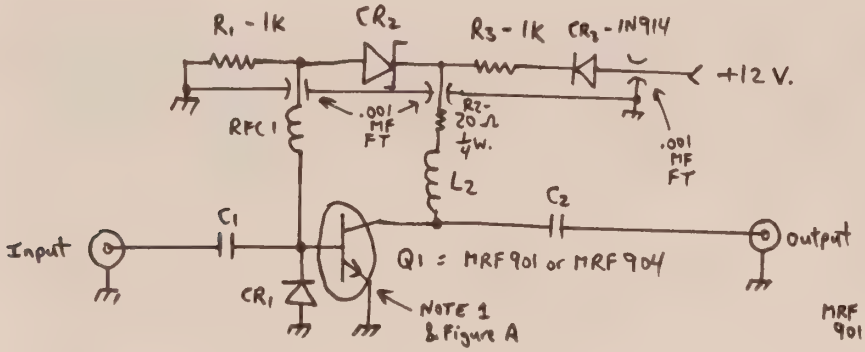
Ref. 1 "Ultra Low-noise UHF Preamplifier", by J. Reisert, W1JAA, Ham Radio Magazine, March 1975.

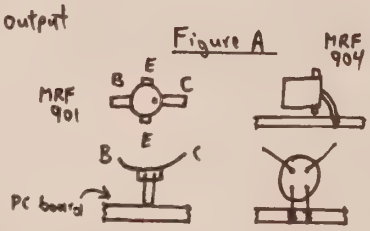
INEXPENSIVE 70 CM LOW-NOISE PREAMP WITH MRF901 OR MRF 904

Ref: Ham Radio Magazine, March 1975

Gain: 12 - 14 dB Typical

Noise figure: 1.75 ± 0.25 dB





C1 - 50 pf dipped Mica

C2 - 5.0 pf dipped Mica

CR1 - Hewlett Packard 5082 - 2810 or equivalent hot carrier diode

CR2 - 6.2 volt zener diode, 1N4735 or equivalent

L1 - Deleted

L2 - 3T #24 on 1/10" ID Space Wire diameter

R2 - 20 ohm, ¼ Watt

RFC 1 - 0.47 µh Nytronics deciductor or 15T #32 AWG enamel covered copper wire on 1/10" ID spaced wire diameter

Notes: 1. Mount transistor as shown in Figure A with leads just touching pc board (see text).

PHASE III PROGRESS REPORT

By Jan King, W3GEY

Considerable progress has been made on the satellite and ground equipment; however, all of us are beginning to understand and appreciate the problems associated with developing a spacecraft some five times more complex than AMSAT-OSCAR 7. It's really quite a big project. The following is a summary of our progress and problems to date.

ESA/AMSAT and ARIANE

On March 22, 1978 the European Space Agency (ESA) conducted a payload interface meeting to which AMSAT was invited. Since the meeting involved launch operations as well as integration of Phase III to the vehicle, it was mandatory that AMSAT send a U.S. representative. The meeting was held in Toulouse, France and Karl Meinzer, DJ4ZC and myself attended. Many of the detailed interfaces to the ARIANE vehicle were discussed and many safety items relating to our kick motor (as could be expected) were reviewed in detail. I am happy to report that AMSAT's scheme for firing the motor and for "keeping it safe" while on the launch vehicle were accepted by ESA. This is important because other proposed schemes would have cost AMSAT several thousand extra dollars and would have increased the satellite weight by about 3kg. ESA announced during the meeting that there is some chance that the launch could be advanced by one month, to November, 1979. This would make an already tight development schedule even tighter.

During the visit to ESA, Karl and I were able to see a considerable amount of hardware. Perhaps the most impressive to me was a one-third scale model of the upper stage of the ARIANE rocket for launch test flight LO2, including all the satellites. A complete scale model of Phase III was mounted at its appropriate place on the side of the larger mock-up. A message I came away with from this meeting is that ESA is not taking any chances. This vehicle is going on schedule and based on the things I saw, it's going to be reliable.

Phase III Ground Stations and IPS

Ground operations for the Phase III launch are far more demanding than those needed for Phase II satellites. For this reason, ground equipment needs to be finished well ahead of the satellite. Since Randy Smith, VE3SAT, will be away on extended leave during the first part of the Phase III-A mission, John Fox, WØLER and Ron Dunbar, WØPN, together will be prime command and telemetry stations for Phase III. Randy will join in upon his return. Located approximately 200 miles apart, Ron and John will have a truly redundant system. Each ground station can back up the other. In fact, each can control the other's station from his own location via telephone or radio link. The Minnesota team expects to complete their ground station check-out by this fall and begin a one-year training period in preparation for the launch. Included will be several simulations of the launch day.

In order to facilitate writing software for the new spacecraft, Karl, DJ4ZC, has developed a high-level language for the RCA CDP-1802 processor and for the 8080's which will be used at the ground stations. This language, known as I.P.S. (for a German acronym) is a structural language which has some similarities to a language known as FØRTH. Among its features, many of them unique, is the fact that the mnemonics themselves are bilingual. They may be changed from German to English (or vice versa) under software control. AMSAT hopes to make this language available to its members as part of a Phase III package which will also include printed-circuit boards needed for demodulating the engineering beacon telemetry and interfacing to a microprocessor, as well as needed documentation. We still have a way to go before this can be done.

Ron, WØPN, recently went to Germany (taking along and bringing back an 8080 system) to visit Karl and complete needed documentation to interface IPS to the 8080 system he and John, WØLER, are using. This visit also served to bring Ron up to speed on all the engineering details on the Phase III spacecraft.

AMSAT-OSCAR Spacecraft Laboratory

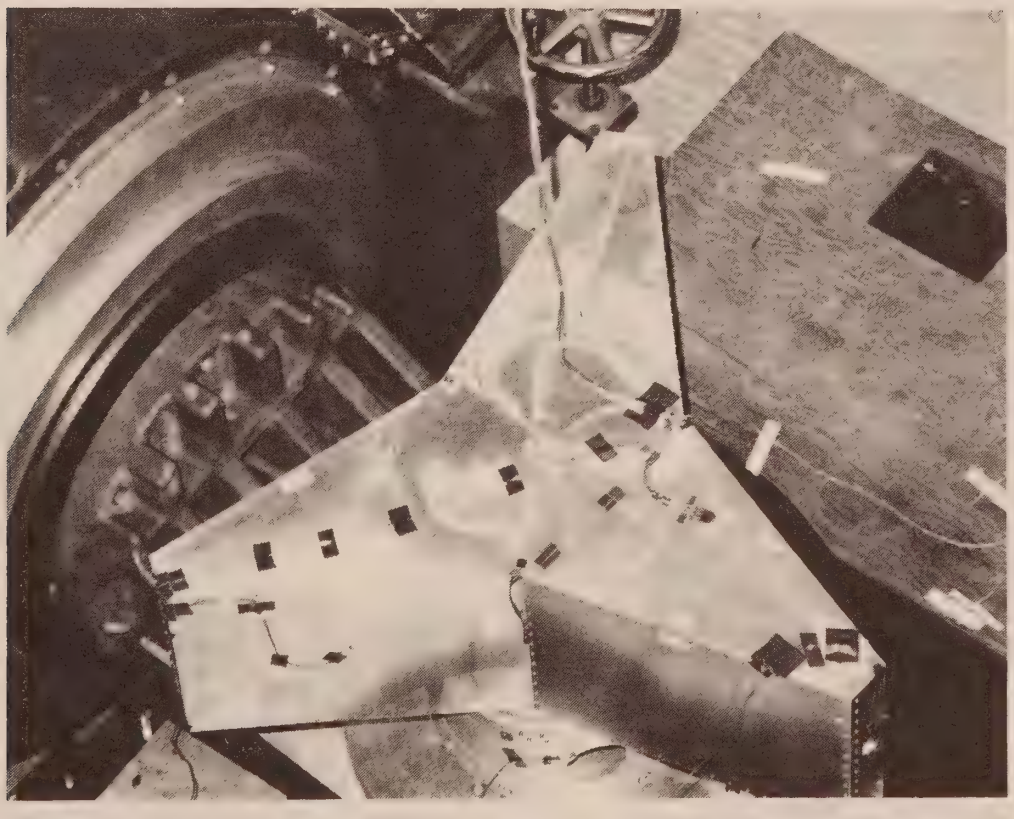
On May 5, 1978 NASA and AMSAT signed a contract to jointly pursue a project that will allow AMSAT to demonstrate to the public how amateurs build spacecraft (specifically Phase III). Under the terms of the contract, AMSAT and NASA will jointly fund a facility at the Goddard Space Flight Center to be used by AMSAT

to construct our new Phase III satellites. In return, AMSAT will demonstrate to NASA visitors our approach to low-cost aerospace construction. The facility, about 700 square feet in area, includes an integration area, an assembly laboratory, a much-needed storage area for high reliability components, and an office area. The building should be ready in August and will be dedicated at our Annual Meeting on October 14th.

Phase III Spacecraft

A) Structure - More than any other part of the spacecraft, the structure has undergone an evolutionary process. After a number of preliminary concepts were discarded and two different models were built, a structure known as the ETU (Engineering Test Unit) was built in West Germany. The structure was then sent to the U.S. where a "dummy" kick motor and wooden modules were installed to simulate the flight spacecraft. In December of 1977 the ETU was sent to the Cal. Tech. Jet Propulsion Lab in California where it was subjected to vibration qualification tests at levels specified for the ARIANE vehicle. While the structure passed the tests successfully, a number of changes were suggested by the test results. These changes are now being incorporated into the final design and materials are being ordered in preparation for assembly of the flight structures (two will be built). In the meantime, the ETU was returned to AMSAT-DL for inclusion of engineering model electronic modules. The completed ETU will then be sent to ESA for further testing starting in September of this year.

B) IHU - of the electronic systems in Phase III, the Integrated Housekeeping Unit (IHU) is the most tested and ready for flight. The IHU which contains the COSMAC microprocessor has been tested at the prototype level for many thousands of hours. The command detector and telemetry encoder schemes have been tested in prototypes with CDP-1801 COSMAC while located at a remote repeater site (60 miles distant from the control site). The results (in terms of bit error rate) are extremely close to the theoretically predicted performance. With the ever-improving technology in CMOS devices, it now will be possible to fly 16K of RAM memory in the flight IHU instead of the originally-planned 2K of memory. Features have been added to the IHU to allow range measurements to be made via the command and telemetry links, and to allow retransmission of the results of range measurements from one command station to another, again via the IHU.



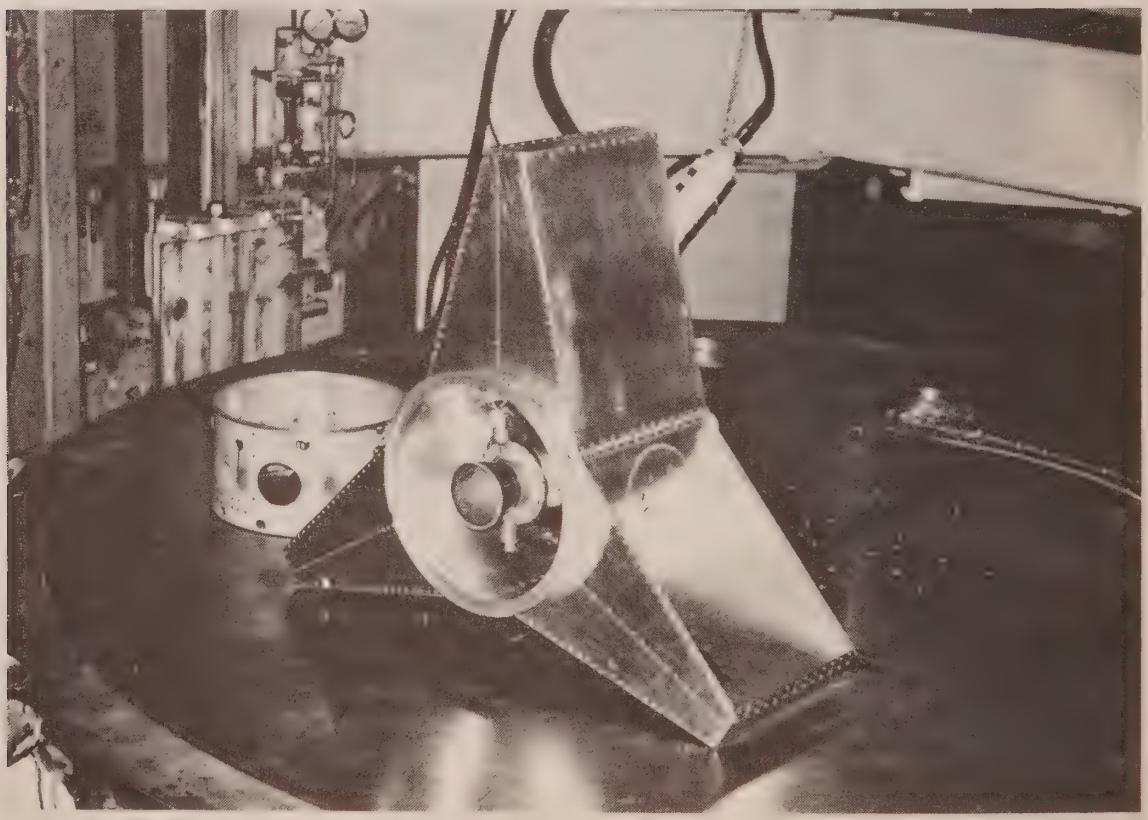
C) Power Subsystem - AMSAT is presently working with NASA and NOAA to obtain 48 battery cells remaining from the ITOS satellite program (enough cells for several spacecraft). In addition, some 10,000 solar cells may also be obtained from the same source. While the cost of the cells is itself high, even if the cells are donated the cost of the cover slips and fabrication will still amount to approximately $10/cell. (Those members who sponsored solar cells take note - at $10.00 per cell (assembled) it's a bargain!) We should know the prospects of obtaining this leftover hardware by the time you read this.

The battery charge regulator (BCR) for Phase III is very similar to that flying in AMSAT-OSCAR 8. Although A-O-8's BCR is less sophisticated than that for Phase III, it verifies the concept of converting power from 28 volt solar arrays to a 12-14 volt battery system which is the same for both satellites. In Phase III, the BCR and all other DC-to-DC converters will be contained in a single power module.

D) Attitude Control Subsystem - The concept that makes Phase III so different from previous satellites is that it has an "active" attitude control system. This difference is quite profound. While former satellites were mere "boxes with electronics inside", this spacecraft is a robot which can be instructed to assume any attitude we choose in space under remote control and it can tell us when it gets there. We have one constraint with our robot though: it wants to spin about one axis. In fact, with the IHU, we may store nearly any number of motions of the spin axis for execution at a later time or under a certain set of conditions.

The components for this system have now all been selected. One "eye" of the robot is similar to a sun sensor used previously on another NASA mission. This sensor tells the spacecraft where the sun is in relation to the spin axis and when the sun passes by one of the three arms. The second "eye" is an earth sensor which gives the relationship of the earth to the satellite at various points in the orbit. The earth sensor is being developed by DJ4ZC with components provided by Leitz, a West German optics manufacturer. The force applied by the satellite to cause it to attain the proper attitude is via interaction of the earth's magnetic field with a large magnetic torquing coil network aboard the spacecraft. Most of the electronics required in this subsystem is to interface these components with the IHU. Many of the logic operations which were once handled by discrete logic controllers can now be performed by the software. A prototype of the torquer coil assembly and the earth sensor are now being assembled in West Germany.

The remaining component in the attitude control system is a fluid damping system; it consists of small tubes partially filled with a viscous fluid, and will stop any nutation (wobble) of the spin axis in a matter of seconds. Prototypes of these tubes have been built and tested and are being incorporated into the ETU.



E) Transponder - The 50-watt version of the 70cm to 2M transponder is still in breadboard at AMSAT-DL. Werner Haas, DJ5KQ, has completed the design of the front-end and I.F. stages and is working on the power amplifier and modulator stages. One flight-quality transponder is expected to be completed by early fall. Unfortunately, due to schedule problems, it presently appears unlikely that the first Phase III spacecraft (Phase III-A) will carry both frequency combinations as had originally been hoped for. The 70cm-to-2M transponder was chosen for development first because it provides better link performance. The 2304 MHz S-Band beacon is likely to be dropped for the same reason and because no allocation can be assured until the 1979 World Administrative Radio Conference.

One particularly continuing problem associated with the transponder has been solved. Until recently it was not possible to find a good quality crystal filter with a bandwidth of 150 kHz. JAMSAT members have approached the Japanese firm which provided the filter for the A-O-8 Mode J transponder regarding this problem and they can provide a 150-kHz bandwidth filter to AMSAT specifications.

F) Antenna Subsystem - The antenna system is indeed a very critical system to proper Phase III performance and more work needs to be done in this area. A computer model for predicting antenna patterns for Phase III has been developed by Tom Clark, W3IWI (ex WA3LND). With this model, it was possible to determine that one antenna system at the end of the arms could not be used on two meters as well as 70cm. It is now felt that a separate 70cm antenna will be placed along the spin axis of the spacecraft on the end opposite the motor. A one-third scale model of Phase III was recently constructed by Bill Hodzik, WA2UDT, so that detailed antenna pattern measurements could be made. These measurements are planned to take place in the next few months at NASA so that flight antennas may be built from this data.

Summary

To date, I feel we have made reasonable progress on Phase III, particularly considering the many other activities in which AMSAT has been involved. We do, however, have a long way to go and not much time is left. I would like to personally thank all those who have so generously donated to the Phase III effort and those who have offered their technical help. For those in the latter category, please be patient. Very little of the design information for "production" of the flight electronics has been released by AMSAT-DL. Much of this documentation is expected very soon and we will try to give some work to everyone.

BOOK REVIEW: HR REPORT

By Perry Klein, W3PK

For those not familiar with it, "HR Report" is a four-page weekly newsletter published by the Ham Radio Publishing Group, publishers of "Ham Radio Magazine" and "Ham Radio Horizons." It's mailed each week via first class mail to subscribers in North America and via air mail to overseas subscribers. We mention "HR Report" here because of its substantial coverage of AMSAT-OSCAR activities. Each week it includes a half-page or so of the latest satellite information, and it has earned a reputation as an official source for AMSAT news. This will come as no surprise, as the editor is none other than Joe Schroeder, W9JUV, AMSAT Area Coordinator, AMSAT Life Member, and an avid OSCAR satellite user. Joe checks into the 3850 kHz AMSAT nets each Tuesday evening (held at 0100, 0200 and 0300 UTC Wednesdays) which he finds a good source of the latest happenings, and much to everyone's amazement the information appears in subscribers' mailboxes the following Monday, a mere six days later!

AMSAT has been criticized by some as not communicating efficiently with our members. Since the"AMSAT Newsletter" is only published quarterly and relatively few members can participate in the AMSAT nets, "HR Report" certainly fills a need in support of the satellite program. Issues typically include reference orbits for AMSAT-OSCAR 8 and the latest OSCAR DX information. Here's a sample of satellite news from the May 12, 1978, issue (No. 201) of "HR Report":

(Continued on Pg. 31)

AMSAT-OSCAR 8 1978 REFERENCE ORBITS

Period: 103.231836 - 1.117×10^{-6} N minutes

Longitude Increment: 25.80870162 - 2.325×10^{-7} N degrees
where N = orbit number

Method used: Quadratic least-squares fit to first 45 NASA prediction bulletins. Analysis by W3IWI.

1978 Date	Refer. Orbit	Equatorial Crossing Time (UTC)	Degrees W. Longitude	1978 Date	Refer. Orbit	Equatorial Crossing Time (UTC)	Degrees W Longitude
June 1	1218A	0048	51.4	July 25	1971A	0020	45.0
June 2	1232A	0053	52.7	July 26	1985X	0025	46.4
June 3	1246J	0058	54.0	July 27	1999A	0030	47.7
June 4	1260J	0103	55.3	July 28	2013A	0035	49.0
June 5	1274A	0109	56.6	July 29	2027J	0041	50.3
June 6	1288A	0114	58.0	July 30	2041J	0046	51.6
June 7	1302X	0119	59.3	July 31	2055A	0051	52.9
June 8	1316A	0124	60.6				
June 9	1330A	0129	61.9	Aug. 1	2069A	0056	54.3
June 10	1344J	0135	63.2	Aug. 2	2083X	0102	55.6
June 11	1358J	0140	64.6	Aug. 3	2097A	0107	56.9
June 12	1371A	0002	40.1	Aug. 4	2111A	0112	58.2
June 13	1385A	0007	41.4	Aug. 5	2125J	0117	59.5
June 14	1399X	0012	42.7	Aug. 6	2139J	0122	60.8
June 15	1413A	0018	44.0	Aug. 7	2153A	0128	62.1
June 16	1427A	0023	45.3	Aug. 8	2167A	0133	63.5
June 17	1441J	0028	46.6	Aug. 9	2181X	0138	64.8
June 18	1455J	0033	48.0	Aug. 10	2194A	0000	40.3
June 19	1469A	0038	49.3	Aug. 11	2208A	0005	41.6
June 20	1483A	0044	50.6	Aug. 12	2222J	0010	42.9
June 21	1497X	0049	51.9	Aug. 13	2236J	0016	44.2
June 22	1511A	0054	53.2	Aug. 14	2250A	0021	45.5
June 23	1525A	0059	54.5	Aug. 15	2264A	0026	46.9
June 24	1539J	0105	55.9	Aug. 16	2278X	0031	48.2
June 25	1553J	0110	57.2	Aug. 17	2292A	0037	49.5
June 26	1567A	0115	58.5	Aug. 18	2306A	0042	50.8
June 27	1581A	0120	59.8	Aug. 19	2320J	0047	52.1
June 28	1595X	0125	61.1	Aug. 20	2334J	0052	53.4
June 29	1609A	0131	62.4	Aug. 21	2348A	0057	54.7
June 30	1623A	0136	63.8	Aug. 22	2362A	0103	56.1
				Aug. 23	2376X	0108	57.4
July 1	1637J	0141	65.1	Aug. 24	2390A	0113	58.7
July 2	1650J	0003	40.6	Aug. 25	2404A	0118	60.0
July 3	1664A	0008	41.9	Aug. 26	2418J	0123	61.3
July 4	1678A	0014	43.2	Aug. 27	2432J	0129	62.6
July 5	1692X	0019	44.5	Aug. 28	2446A	0134	63.9
July 6	1706A	0024	45.9	Aug. 29	2460A	0139	65.3
July 7	1720A	0029	47.2	Aug. 30	2473X	0001	40.8
July 8	1734J	0034	48.5	Aug. 31	2487A	0006	42.1
July 9	1748J	0040	49.8				
July 10	1762A	0045	51.1	Sept. 1	2501A	0011	43.4
July 11	1776A	0050	52.4	Sept. 2	2515J	0017	44.7
July 12	1790X	0055	53.8	Sept. 3	2529J	0022	46.0
July 13	1804A	0100	55.1	Sept. 4	2543A	0027	47.3
July 14	1818A	0106	56.4	Sept. 5	2557A	0032	48.6
July 15	1832J	0111	57.7	Sept. 6	2571X	0037	50.0
July 16	1846J	0116	59.0	Sept. 7	2585A	0043	51.3
July 17	1860A	0121	60.3	Sept. 8	2599A	0048	52.6
July 18	1874A	0127	61.6	Sept. 9	2613J	0053	53.9
July 19	1888X	0132	63.0	Sept. 10	2627J	0058	55.2
July 20	1902A	0137	64.3	Sept. 11	2641A	0103	56.5
July 21	1916A	0142	65.6	Sept. 12	2655A	0109	57.8
July 22	1929J	0004	41.1	Sept. 13	2669X	0114	59.1
July 23	1943J	0009	42.4	Sept. 14	2683A	0119	60.5
July 24	1957A	0015	43.7	Sept. 15	2697A	0124	61.8

AMSAT-OSCAR 8 1978 REFERENCE ORBITS - CON'T.

1978 Date	Refer. Orbit	Equatorial Crossing Time (UTC)	Degrees W. Longitude
Sept. 16	2711J	0129	63.1
Sept. 17	2725J	0135	64.4
Sept. 18	2739A	0140	65.7
Sept. 19	2752A	0002	41.2
Sept. 20	2766X	0007	42.5
Sept. 21	2780A	0012	43.8
Sept. 22	2794A	0017	45.2
Sept. 23	2808J	0023	46.5
Sept. 24	2822J	0028	47.8
Sept. 25	2836A	0033	49.1
Sept. 26	2850A	0038	50.4
Sept. 27	2864X	0043	51.7
Sept. 28	2878A	0049	53.0
Sept. 29	2892A	0054	54.3
Sept. 30	2906J	0059	55.7
Oct. 1	2920J	0104	57.0
Oct. 2	2934A	0109	58.3
Oct. 3	2948A	0115	59.6
Oct. 4	2962X	0120	60.9
Oct. 5	2976A	0125	62.2
Oct. 6	2990A	0130	63.5
Oct. 7	3004J	0135	64.8
Oct. 8	3018J	0141	66.2
Oct. 9	3031A	0003	41.7
Oct. 10	3045A	0008	43.0
Oct. 11	3059X	0013	44.3
Oct. 12	3073A	0018	45.6
Oct. 13	3087A	0023	46.9
Oct. 14	3101J	0029	48.2
Oct. 15	3115J	0034	49.5
Oct. 16	3129A	0039	50.8
Oct. 17	3143A	0044	52.1
Oct. 18	3157X	0049	53.5
Oct. 19	3171A	0055	54.8
Oct. 20	3185A	0060	56.1
Oct. 21	3199J	0105	57.4
Oct. 22	3213J	0110	58.7
Oct. 23	3227A	0115	60.0
Oct. 24	3241A	0121	61.3
Oct. 25	3255X	0126	62.6
Oct. 26	3269A	0131	64.0
Oct. 27	3283A	0136	65.3
Oct. 28	3297J	0141	66.6
Oct. 29	3310J	0003	42.1
Oct. 30	3324A	0009	43.4
Oct. 31	3338A	0014	44.7
Nov. 1	3352X	0019	46.0
Nov. 2	3366A	0024	47.3
Nov. 3	3380A	0029	48.6
Nov. 4	3394J	0034	49.9
Nov. 5	3408J	0040	51.3
Nov. 6	3422A	0045	52.6
Nov. 7	3436A	0050	53.9
Nov. 8	3450X	0055	55.2
Nov. 9	3464A	0100	56.5
Nov. 10	3478A	0106	57.8
Nov. 11	3492J	0111	59.1
Nov. 12	3506J	0116	60.4
Nov. 13	3520A	0121	61.7
Nov. 14	3534A	0126	63.0
Nov. 15	3548X	0132	64.4
Nov. 16	3562A	0137	65.7
Nov. 17	3576A	0142	67.0
Nov. 18	3589J	0004	42.5
Nov. 19	3603J	0009	43.8
Nov. 20	3617A	0014	45.1
Nov. 21	3631A	0020	46.4
Nov. 22	3645X	0025	47.7
Nov. 23	3659A	0030	49.0
Nov. 24	3673A	0035	50.3
Nov. 25	3687J	0040	51.7
Nov. 26	3701J	0045	53.0
Nov. 27	3715A	0051	54.3
Nov. 28	3729A	0056	55.6
Nov. 29	3743X	0101	56.9
Nov. 30	3757A	0106	58.2
Dec. 1	3771A	0111	59.5
Dec. 2	3785J	0117	60.8
Dec. 3	3799J	0122	62.1
Dec. 4	3813A	0127	63.4
Dec. 5	3827A	0132	64.7
Dec. 6	3841X	0137	66.1
Dec. 7	3855A	0142	67.4
Dec. 8	3868A	0004	42.9
Dec. 9	3882J	0010	44.2
Dec. 10	3896J	0015	45.5
Dec. 11	3910A	0020	46.8
Dec. 12	3924A	0025	48.1
Dec. 13	3938X	0030	49.4
Dec. 14	3952A	0036	50.7
Dec. 15	3966A	0041	52.0
Dec. 16	3980J	0046	53.3
Dec. 17	3994J	0051	54.6
Dec. 18	4008A	0056	56.0
Dec. 19	4022A	0101	57.3
Dec. 20	4036X	0107	58.6
Dec. 21	4050A	0112	59.9
Dec. 22	4064A	0117	61.2
Dec. 23	4078J	0122	62.5
Dec. 24	4092J	0127	63.8
Dec. 25	4106A	0133	65.1
Dec. 26	4120A	0138	66.4
Dec. 27	4134X	0143	67.7
Dec. 28	4147A	0005	43.2
Dec. 29	4161A	0010	44.5
Dec. 30	4175J	0015	45.9
Dec. 31	4189J	0020	47.2

AMSAT-OSCAR 8 1979 REFERENCE ORBITS

Jan. 1	4203A	0026	48.5
Jan. 2	4217A	0031	49.8
Jan. 3	4231X	0036	51.1
Jan. 4	4245A	0041	52.4
Jan. 5	4259A	0046	53.7
Jan. 6	4273J	0052	55.0
Jan. 7	4287J	0057	56.3
Jan. 8	4301A	0102	57.6
Jan. 9	4315A	0107	58.9
Jan. 10	4329X	0112	60.2
Jan. 11	4343A	0117	61.5
Jan. 12	4357A	0123	62.9
Jan. 13	4371J	0128	64.2
Jan. 14	4385J	0133	65.5
Jan. 15	4399A	0138	66.8
Jan. 16	4412A	0000	42.3
Jan. 17	4426X	0005	43.6
Jan. 18	4440A	0010	44.9
Jan. 19	4454A	0016	46.2
Jan. 20	4468J	0021	47.5
Jan. 21	4482J	0026	48.8
Jan. 22	4496A	0031	50.1

AMSAT REPRESENTATION AT THE IARU REGION 1 CONFERENCE AT MISKOLC-TAPOLCA, HUNGARY

By Pat Gowen, G3IOR

Our members will need no introduction to the work and planning performed by the International Amateur Radio Union, which has been acting on behalf of the interests of the world community of Radio Amateurs so successfully for so many years.

What may be less well known is that IARU Region 1 has been supporting the AMSAT-OSCAR programme also, by a regular input of much needed financial support, and by the fact that the Region 1 Secretary, Roy Stevens, G2BVN, is also a keen and active member of both AMSAT-USA and AMSAT-UK.

As normally only national societies are represented, it was not clear that AMSAT as an international body could be directly represented, but, thanks to the Radio Society of Great Britain, I was invited to attend the conference April 24-28 in my capacity of both Chairman of AMSAT-UK and as a director of AMSAT by being accepted as a member of the RSGB delegation, so that papers on satellite matters could be presented and adequately discussed. Thus, it transpired that four papers dealing with the needs of OSCAR users were contributed through the medium of our National Society for inclusion in the agenda to be discussed at the North-West Hungary venue, where the Magyar Rádióamatőr Szövetség were our hosts.

As yours truly had booked an early flight, which are so much cheaper during the week, to cut the costs to a minimum, it transpired that armed only with an HA:G/G:HA dictionary, two suitcases mainly of literature and some Hungarian currency, arrived at Budapest Airport, to try to find a means of getting to Miskolc-Tapolca which is close to the UA-OK border. Let it be said at this point that the Hungarian language bears no relationship whatsoever to any other European tongue, as there is no Latin, Tuetonic, Serbian, Croatian or other root. It soon became apparent that smatterings of English, French, German, Serbo-Croat, Italian and Spanish were of no value, but by some incredible luck the Railway station, correct ticket office, the right ticket, correct time and platform hence train, and alighting point were found, and the Hotel Juno soon after. The full and traumatic story of the journey may be related at a future General meeting. After a series of room changes, we settled in till the following day to meet arriving guests.

Delegates were present from VE, W, 7X, A9, I, 3A2, LZ, OK, OZ, DL, YO, 4X4, TF, EI, HA, 5N2, LA, OE, SP, F, DM, LX, UA, G, OH, YU, SM, ON, HB, and PA, filling the entire hotel, and much lobbying went on.

The meeting was opened with a superb speech by Mr. Dezso Horn, Deputy Minister of Telecommunications of the Hungarian Peoples Republic, who welcomed the delegates with a speech that made one feel very proud to be a radio-amateur, and very much at home in Hungary.

The second speech was made by Mr. Butler, Deputy Secretary General of the ITU, who also spent much time and effort involved with the conference. Having been made aware of AMSAT and the OSCAR programme, and having just returned from a visit to the satellite station of HG5BME at the Technical University of Budapest where he was impressed by a demonstration of a faultless orbit, he added "off the cuff" to his carefully prepared speech his appreciation of the work being performed by amateurs in our programme. Worth quoting is "... it is the duty of radio-amateurs to see that the enormous possibilities of space communication reach the general public..."

That same afternoon, the Committees started in earnest, and one of the first papers to come up was M/T 32, a long paper dealing with the needs of amateur satellites for further bands, and an increase in the present allocation of 155kHz on the two meter band to allow for the enormous increase in both the number of users and for future satellites, these with increased coverage and time available. After much deliberation, due to the competing interests of repeaters in the band which were well represented, the decision was deferred until after related subjects dealing with repeater bandwidths, bandplans, RTTY specific frequencies, etc. had been covered also.

The need for a space allocation from 144.350 to 144.450 MHz to permit utilization of the 436-438 MHz section of the currently available band with freedom from on-board or earth-station harmonics met with virtually no support, due, it was felt, to the greater representational interest of the current heavy employ of this section in Europe.

Of the topics covered by the one hundred and seven papers presented and discussed, AMSAT was included in sixty-two of them, and commented upon thirty-five. As the two committees were meeting at the same time in separate rooms, not all the papers could be covered by one individual, but they were timed so that adequate representation was possible. Thus, we had opportunity to comment upon additional frequencies for space communication, exclusive bands, expansion of facilities in existing bands, congestion, bandplans, linear and normal repeaters and their allocation, UHF band planning, beacons as related to OSCAR, individual space allocations on other bands to be proposed, locator systems, sporadic E results and plans, ethics and practice for satellite communications, observation service, satellite bandplanning, OSCAR News service by HG5BME, ERP data, Aurora forecasting, emergency services, and many, many other related subjects in which the voice of the amateur satellite fraternity was both needed and appreciated.

To avoid my possible mis-interpretation due to optimism, I quote the actual wording of the official minutes on those matters affecting our mutual interest:

"Recommendation B. 2 m. band plan - Amateur Space Service.

In view of the important public relations aspects of amateur satellite activity which calls for the widening of the frequency band allocated to the space service in the 2 m. band, the following temporary measures are recommended for the coming three years:

(1) The radio-amateur satellite service will be allowed to use the band 145.8 - 146 MHz for OSCARs currently planned.

(2) That although the two-meter band-plan will retain R.8 and R.9 as repeater output channels, no further repeaters should use these channels and temporary shut-down of existing repeaters should be encouraged. Where this is not possible, repeater and satellite users should make every effort to coordinate operations to minimize mutual interference.

It is expected that space allocations for higher frequencies will be allowed at WARC '79 and that future amateur satellites will move to higher frequencies where wider bandwidths will be possible."

"Recommendation H - TV Repeaters.

That because concern was shown about W. German TV repeaters being operated in the 70 cm space band, DARC is urged to adhere to the Region 1 band plan and coordinate the move of these repeaters and other activity to higher bands."

"Recommendation I - World Wide Location Fixing System

That Region 1 consults with Regions 2 and 3 in order to look into the possibility of adopting a world-wide location fixing system. Also that in the meantime the QTH locator system continue to be used in Europe."

"Recommendation L - Observation Service

That the councils of all national societies look into the possibility of the formation of a National Observation Service aimed at maintaining high operating and technical standards on the bands above 30 MHz."

"Recommendation M- OSCAR Band Planning

Region 1 supports AMSAT's band plan proposals and recommends that publicity be given in all national society magazines to the OSCAR band planning proposals contained in M/T 30." (M/T 30 was the bandplan as recently published in OSCAR NEWS and the AMSAT Newsletter as drawn up by G3IOR and G3ZCZ/W3 with its reasoning and justification.)

"Recommendation N - OSCAR Ethics and Practices

That publicity be given, probably on an annual basis, to the correct ethics and practices (M/T 31) for satellite operating and to look into the possibility of setting up national monitoring of OSCARs, in order to take direct action on those who do not observe the internationally agreed rules. Further, it is recommended that each national society should (a) write to offending amateurs in its own country (members or not) to point out the correct ethics and practices

expected of them, and (b) to report directly to other national societies any apparent infringements of the established ethics and practices emanating from that country."

"Recommendation O - OSCAR News Bulletins

That all Region 1 societies contribute information for the OSCAR News Bulletins transmitted from the Technical University of Budapest on SSB, Rtty, and CW each Wednesday."

"Recommendation Q - 2 Meter Beacons

That there should be no beacons in the CW section of the VHF/UHF bands. All existing beacons should be moved to the beacon sub-band under the coordination of RSGB."

Those quoted are those affecting OSCAR and the AMSAT programme directly. There are more that relate to our operations on an indirect basis also, but the inclusion of all the detail would need a comprehensive book.

Certainly, the amateur radio movement has been considerably aided by the deliberations and decisions of the conference, and the results will help our community at WARC '79. Distinct from the official capacity of the many meetings, our field was also aided by the many discussions held with the representatives of the many countries present, in helping to further aquaint them with the aims and ambitions of AMSAT and the OSCAR programme in the amateur radio satellite service that has opened a new and valuable field to the amateur-radio movement.

I would like to thank RSGB and AMSAT for their financial assistance to my travel and accommodation, the IARU for their support and consideration and for all the work and planning that went into the productive meeting, and the radio amateurs of Hungary whose hospitality and friendship were boundless.

AMSAT GRATEFULLY ACKNOWLEDGES DONATIONS OF $100 OR MORE FROM THE FOLLOWING NEW LIFE MEMBERS

LM-841 Jean Pierre Bedard, VE2BOS
LM-842 Charles Proffer, Miss.
LM-843 Wayne E. Baldwin,Wash.
LM-844 Alfredo Carlos Andrade, PY1UHF
LM-845 Mario Fric, HK3OK
LM-846 Frank Pezzlo, Calif.
LM-847 L.H. Craig, WB7PXW
LM-848 Jesus Suarez, EA1QJ
LM-849 Jack Troup, WA6JYU
LM-850 Dennison Fairchild III -APO, NY
LM-851 Ray A. Good III, WB9DVQ
LM-852 Richard Lobb, VE7II
LM-853 Perry F. Crabill, Jr., W3HQX
LM-854 Geoffrey Radcliffe, VK2ZAZ
LM-855 Noel Armstrong, WB5CMB
LM-856 Alfred Dowd, W2ARO
LM-857 Jean Charron, F6CBC
LM-858 Steven Binning, WA9NRB
LM-859 Andrew Beaulieu, N4CX
LM-860 Franklyn M. Grosso, K2MLB
LM-861 Ronald R. Wood, KØBRO
LM-862 G. Campbell, VK2ZQC
LM-863 Frederick J. Feddersen, WA1YDC
LM-864 Dale Hagert, WBØCOR
LM-865 H.G. Hughes, G4CG
LM-866 Nelson R. Nail, WA2ZPE
LM-867 Lewis M. Barnard, Jr., W2KIM
LM-868 Lee J. Jones, WB4JTR
LM-869 Desmond G. Goggins, K9RVG/EI2VJK
LM-870 Don H. Gross, W3QVC
LM-871 Bruce I. Cartwright, WA1UGK
LM-872 Robert W. McLaughlin, WB8UYA
LM-873 Willy Goovaerts, ON5JM
LM-874 John F. Rice, K9IJ
LM-875 Thomas E. Doyle, WA9FTH

LM-756 T. Tugwell, G8KMV

LM-876 Dr. Ben Gorsky, K8BG
LM-877 Eddie Scales, W7MME
LM-878 Dr. Luigi Marotta, I8VOY
LM-879 Catherine Rochlitzer, W7OBH
LM-880 James Kulp, K3SW
LM-881 William G. Brown, K9LF
LM-882 Edward W. Dunn, Jr., W4NZW
LM-883 Richard B. Jones, W4RJC
LM-884 John E. Matz, WA9KIO
LM-885 Robert M. Stanley, WØITB
LM-886 Rex Widmer, WBØITA
LM-887 Robert A. Hosea, WD8NRL
LM-888 Lee Wical, KH6BZF
LM-889 Dick Smith, VK2ZIP
LM-890 Otto L. Rieben, WAØLIB
LM-891 Frank J. Schwab, W8OK
LM-892 Pete Theer, WB5RPU
LM-893 Serafim Mates da Silva, CT4KQ
LM-894 Benjamin G. Raskob, W5PLK
LM-895 Tom Middleton, WB4CKY
LM-896 Lyell W. Louttit, VS6BE
LM-897 Pierre Hopstaken, ON7HP
LM-898 Ferenc Budavari, KØCP
LM-899 Lloyd J. Teran, W1YJI
LM-900 Peter Frey, HB9MQM
LM-901 Bob Denlinger, WA6VRC
LM-902 Jere D. Bruning, WAØUQA
LM-903 Capt. Antonio Gibelli
LM-904 William C. Ristine, WA7BVH
LM-905 Eduardo Martinez Artero, EA5AEZ
LM-906 Emilio Sanchez-Parra Jaen, EA5AAT
LM-907 Antonio Ciria Gonzalez, EA5AIE
LM-908 Juan Ballesta Capel, EA5TD
LM-909 L.H. Connelly, WD4HAL
LM-910 John L. McDonald, W6SDM

THE AMSAT 80 COMPUTER PROJECT

By Joe Kasser, G3ZCZ

Update

The documentation of AMS-80 took a little longer to prepare than was expected, but it is ready now and available.

The new OB-1 board by Cybercom is available. It contains a BOOT circuit and some kluge area that can be used for MEMW. It is recommended for front panel-less designs. It takes about 30 minutes to build the board.

An Azimuth, Elevation, Range and Doppler program for AMSAT-OSCAR's 7 and 8 is available in North Star Basic. It was written by Tom W3IWI/WA3LND and is yours if you send a North Star Compatible floppy disc and self-addressed stamped envelope to W3IWI.

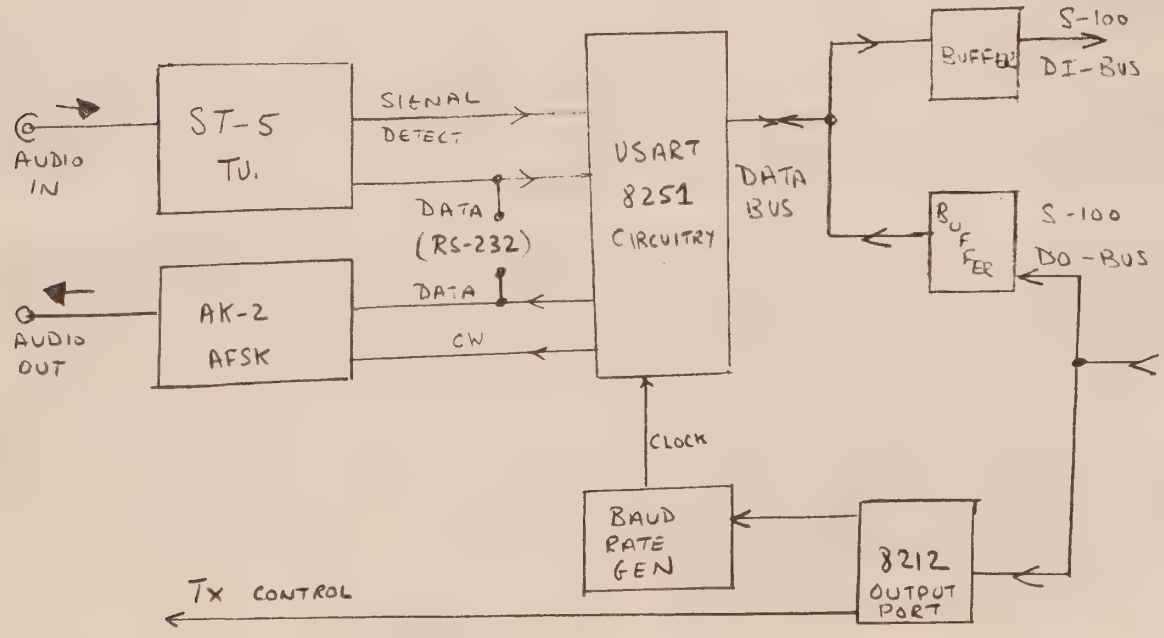
Two prototypes have been constructed and are working. One, pictured last time, has a hardware-front panel, the second has none.

Now that the basic hardware is complete, work will begin on the software. The future is wide open.

Further issues of the Newsletter will carry group purchase plan updates but cannot carry prices. For full details send an SASE to Tom Clark, W3IWI, 6388 Guilford Road, Clarksville, Maryland 21029.

The AR-1 Amateur Radio Interface

We have developed a prototype RTTY interface card for the S-100 bus. It contains a modified ST-5 and AK-2. The modifications make it suitable for meter or scope-less use, inside the main frame. The card also contains an 8251 USART and a programmable baud rate generator, based on a separate crystal, but giving rates of 45.5, 50, 75, and 110 bauds. The card is also suitable for interfacing a morse code signal to the computer. The cost of the bare card and documentation would be about $30.00, if ten or more people show interest. How about it? If you would like the card drop a qsl to G3ZCZ or W3IWI now.



AR-1 Outline Drawing

WHERE DO WE GO FROM HERE?

By Ray Soifer, W2RS*
60 Waldron Ave.
Glen Rock, NJ 07452

AMSAT-OSCAR 8 has been successfully launched, tested and turned over to ARRL. The bulk of AMSAT's effort will now go into the Phase III program. Is there anything we have learned from the operation of the three Phase II satellites which could help to insure the success of the Phase III?

Of the three satellites utilizing Mode A transponders, and thus directly comparable, most users would agree that AO-6 was the best from the standpoint of downlink signal strength in everyday operation with low to moderate uplink power. Yet, neither its input sensitivity nor its power output, in the single-signal condition, was superior to the others. The evaluation tests of AO-8 proved, to our satisfaction, that this disparity resulted from the AGC characteristics of the newer satellites under loaded conditions. Specifically, their AGC action takes hold at too low a threshold and degrades sensitivity too greatly. As an example, measured downlink signals from AO-8 from W2RS were at least 20 dB lower during heavily loaded conditions than with very light or no loading.

Such a system, far from encouraging low power operation, actually accomplishes the reverse, as users resort to higher power to maintain reliable communication under heavy loading. Since users cannot predict the consequences of high power operation by others, they tend to leave their own high power on at all times. As a further test, a friend of ours aimed 15 KW EIRP at AO-8 during a recent pass over the midwestern USA, only to find that his downlink signal, while strong, was a full S-unit weaker than several others. Obviously, not all the super-power users are in Europe! We always thought that the purpose of OSCAR was communication with low power and simple antennas.

This reminds us very much of the early evolution of HF SSB. Twenty years ago as K2QBW, we literally worked the world on twenty-meter SSB with twenty watts PEP to a dipole, by participating in the then-common round-tables and waiting our turn. Try doing that on twenty meters today! Propagation hasn't gotten worse, it's just that the competition and crowding have, and with them many of the operating habits.

Now, think of Phase III. In its passband of 150 kHz, it can at best accommodate a small fraction of the projected number of users if they attempt to transmit simultaneously. As has been pointed out by K2UBC, G3ZCZ and others, neither skip zones nor propagation paths nor directional antennas will provide any relief from crowding and mutual interference. If Phase III is ever to justify its considerable cost in effort and money, something has got to be done about power levels and operating habits. Another high power free-for-all like twenty meters, or worse, simply will not do, else why not just stay on HF or aim one's super-station at the moon and not bother with Phase III at all? Who needs orbiting bedlam?

We have two suggestions. First, why not design the AGC system of Phase III to create less incentive for high power? A gentler characteristic with a higher threshold, a la AO-6, would help by reducing desensitization. The AGC should be split among several sub-bands, so that a concentration of users in one sub-band would not affect the sensitivity of the others. We may be dreaming, but we wonder if it would be possible to incorporate some sort of adaptive filter which would automatically seek out and notch the strongest signal in any sub-band?

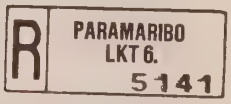
Second, now is the time to begin encouraging round-table and net operation via Phase III. The passband should be fully channelized, with a firm rule of no more than one station transmitting on any channel at once. So-called "emcee" and "list" operation by DX stations, while unpopular with some on the HF bands, would certainly seem to be in order for Phase III, to eliminate pile-ups. It appears virtually certain, to us at least, that failure to maintain strict operating discipline via Phase III would be catastrophic for all concerned.

A final "lesson learned" from Phase II operation has to do with communication. During the first two weeks of AO-8, numerous calls could be heard making unauthorized contacts. Not one of those calls was ever heard by us checking into an AMSAT net. Even some Area Coordinators who do not operate HF or who do not regularly check in did not get word of the scheduled activities. Numerous users have little or no contact with AMSAT activities.

*The author served on the AMSAT Board of Directors from 1972 to 1974.

(Continued on pg. 29)

Letter and Comment



Dear Joe:

The December 1977 Newsletter contained a copy of a letter sent to you by Marvin Berry, WBØLSN in which he inquired about building a solid state cw rig, etc.

Sure, there are lots of schematics in QST issues going back for many years, but the easiest way to get a small compact solid state rig is by investing very little in the kits manufactured by VHF Engineering. The kits are easy to assemble and anyone with a third grade education should be able to understand and follow the assembly instructions.

Whether you operate Mode A or B, high power is not needed as long as you have a half way decent antenna. A Mode B station consists of the TX-432 transmitter accompanied by their PA-432 amplifier. The output on 432 is about 11½ watts on cw. With reasonably short runs of coax, the loss using RG-8 will still allow you an erp of 80 watts with a 10 db antenna.

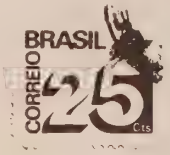
For receiving, I'm utilizing my SB-102 transceiver with a Hamtronics 2 meter converter and preamp in front. It works beautiful. What is even better about using the VHF Engrng. units is the price. The entire set-up for Mode B operation, except for the SB-102, is under $100.

To my way of thinking, that's the only way to go if funds are of a prime consideration. For those individuals desiring to operate Mode B, the cheap way, this is the way to go.

I enjoy getting the newsletter with all the latest info on the computers, as well as on OSCARS and the RS series. Keep up the good work, Joe.

Respectfully,
W. Vern Hajek, K6UGS

(Did you modify the TX-432 for VXO capability? If so, won't you share the technique?-----Joe)



AMSAT:

I would like to propose a method for reducing abuse and misuse of the satellites: AMSAT would call for volunteers to act in a capacity similar to the ARRL Official Observers. Obviously, those selected would have good reputations to begin with! Instead of sending their notices directly to the offenders, they would periodically send a list of calls plus violations to a central person who would then send ONE tactful notice to each offender. The offenses could include operating during X orbits, using CW in the SSB portion of the passband, apparent use of high power, etc.

I believe this could eliminate much of the current problem both from principal and "follow the leader" offenders and would start us off on a better footing for Phase III.

73,

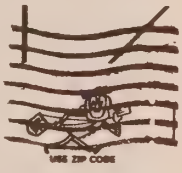
Carl Yaffey, K8NU

(Any volunteers as frequency monitors? ...Joe)

Dear Sir:

Here is a list of stations worked during the June 1977 QRP tests:

DJ4CT
DL3SX
DL9GSA - 2 QSO's
DM2GJL
G2RD
OK3CDI - 4 QSO's
WA2JSW



QRP tests are very interesting! On the first day I heard not many stations, but all stations were running QRP and I was pleased to hear an amazing strong return signal from my 10 watts ERP. On the contrary, on the second day and especially on the third day, many normal high power stations were coming through again and it was hard to work QRP.

Best 73,

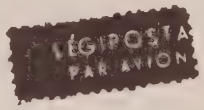
Enrico Masetti, I5IT

Dear Joe:

From the 26th Sept. to 1st Oct. there was here in Caracas, a North American Telecommunications Exhibition organized by the U.S. Embassy. About 100 different U.S. manufacturers of communication equipment, including ham radio equipment showed their products. The Embassy also was nice enough to offer the local radio club a free booth and so we managed to have all kinds of ham equipment operating. The most attractive exhibit was a complete mode "A" and "B" rig and giving live demonstrations. We handed out about 500 Spanish versions of an AMSAT application form and a bulletin giving some rough information about AMSAT and the OSCARS. Up-to-date, we have already received 5 new applications, and hopefully, there will be much more very soon.

Best 73,

Edgar Muller, YV5ZZ



Hi Joe:

First, let me say that I've been an OSCAR 6 and 7 user since early this year. The bug bit me. My membership in AMSAT is very recent, yet I hope it will be a lengthly one.

The Newsletter makes reference to the use of computers at home. Joe, I work with computers all day long and I for one, cannot go home and play with more computers. Certainly their use in the home some day soon will be prevalent, but for now, I would prefer making calculations manually. Besides, the price of a computer is still prohibitive to my pocketbook.

The proposed Band Plan sounds like a feasible move, but I tend to wonder how well CW and SSB stations can and will work together in the mixed mode section, especially on mode B operation. For some reason, I think this section of the band will become a battle ground between the CW and SSB operators, one trying to outdo the other. Hopefully, I'm wrong about this. It might not be a bad idea to plan restructure of the band with each mode having a specific segment just in case hostilities do develop in the mixed mode portion.

Being strictly mode A CW, to date no SSB station has ever acknowledged my call. This leads me to believe that SSB stations don't wish to be bothered with copying CW for whatever their reason. Thus my query about mixed mode operation.

(The mixed mode area is to encourage cross mode contacts, especially by dx-peditions... Regarding the user articles and photo's, we publish most material that is submitted so go ahead and submit some.....Joe)

Another item worth mentioning regarding the Newsletter is an idea I came up with in publishing short articles and pictures of OSCAR operators, shacks and antennas. This practice was adopted by the Northern Calif. DX Club about 2 years ago, allowing members to learn a little about fellow members. Would you feel such an item to be practical in the AMSAT Newsletter? Something to ponder over.

Finally, my compliments to WØLER for his article "Farewell Old Friend". Was very nicely edited and also expresses my feelings.

Tnx & 73's,

Vern, K6UGS

Dear AMSAT:

I wholly support the proposed Satellite Band Plans in Sept. 77 AMSAT Bulletin. I have been pushing for this, especially on O7B, for some time to give the weak signal CW boys a QRM free section void of SSB, etc.

73,

Joe, W1JR

Dear Joe:

I have read through the Newsletter with interest; especially page 31 with the list of new life members. It shows that some amateurs realize the importance of the satellite program. The day should come when AMSAT will be a bigger and more important part of amateur radio than the ARRL.

The financial situation is interesting. The Newsletter indicates that solar cells and batteries have been financed to the extent of some $30,000. If the first $100 from each new life member is put out at 8% interest, six percent will have to be reinvested to take care of inflation and that leaves only 2% to take care of postage and service to members. It doesn't help much on the program. A lot more has to come from somewhere.

This brings me to a personal problem. I gave AMSAT $200 last year and again this year an additional $200. Actually, I have been planning to contribute this amount each year. If 1500 other amateurs were to do the same thing the program would have $300,000 a year. Fifteen hundred amateurs out of over three handred thousand is a small percentage. That kind of money should be forthcoming it would seem to me. In the face of a situation like this, the contributor begins to wonder a little.

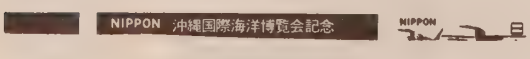
We all want something, be it an inner glow from having helped along a good cause or from anticipation of enjoying the satellites as they are placed in orbit. While it may be worth a thousand bucks to some to have their names inscribed on a plaque on the Phase III satellite, I have heard it is cold out there and have always assumed I can make it to a much warmer place free of charge.

At the age of 76, I don't get around as much as I used to and my only first-hand contact with the satellite program is through an occasional letter to one of you fellows on the front lines. I am drawing blanks. There is a hell of a temptation to retire to the sidelines and join the rooting section.

73,

George Hatherell, K6LK

沖縄国際海洋博覧会記念



Dear Joe:

First to tell you about the fun we had here in HB following the take-off of AO8. The 2 meter relays were hot for hours during the evening of March 5th. Carried away by the excitement some even listened to "AO7" for the first time! There was so much information coming through, that at some points one thought that about five different satellites had been launched! The most valuable information would have been to hear live information on the AMSAT frequency 14.280 MHz, but there was either bad propagation conditions, or the net was somewhere else. The said freq was there, but nobody on, apart from a cleaner who said to reserve the place for AO8 news. Anyway the bird is up and flying, congrats and thanks to all who helped! The same day, I sent a dozen FDC envelopes from Geneva to Zurich with early flight pioneers from Switzerland as stamps. All the best, Joe, and thanks for your fine effort.

73,

Ted Vogel, HB9OP

Dear Sirs:

Boy! Did I goof this morning!

Got on the air, mode A, and called CQ - no response!

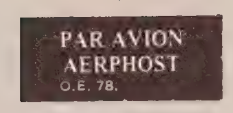
This was OSCAR 7 N-S Orbit #14006.

Two hours later - while occupied on something completely different, "the light suddenly dawned" - that this was Wednesday, and that general QSOs are a no-no, and that Wednesday is reserved for experimental use only.

Sorry that I put a signal on, and hope that I didn't disrupt anything! I will be more attentive to what day it is!

Respectfully,

Howard Randall
W7SEH



Dear Joe:

The AMSAT booth at the Tropical Hamboree, Miami, Florida held on January 21-22 was manned by Walt Dixon, W4DWN and Nick Laub, WØCA. The interest shown was very great and the number of memberships signed up and contributions taken exceeded expectations. A goodly number of booklets, "Getting To Know OSCAR" sold quickly, indicating the increased interest in space communications.

General public exposure was good with Channel 7 News in Miami, devoting a portion of their newscast to live coverage of the AMSAT booth showing models of OSCAR 7, A-O-D and Phase III satellites. Along with that, Walt Dixon, Area Coordinator spoke about the advantages of space communications for the general public.

Nick Laub, WØCA, escaping from the sub-zero temperatures in Northern Minnesota, was on hand to handle some of the questions from the many interested new-comers to space communications via amateur satellites. Nick says, "-- you may as well be down here in the warm weather when you can't track OSCAR because of frozen rotators, but come Spring-look out".

The photograph shows the booth with Walt Dixon (left) and Nick Laub (right). The poster is available from ARRL for $1.00 handling charge.

Nick Laub, WØCA

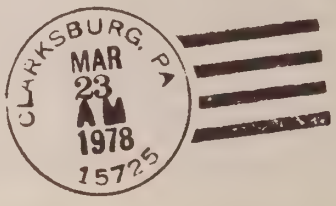
Dear Sir:

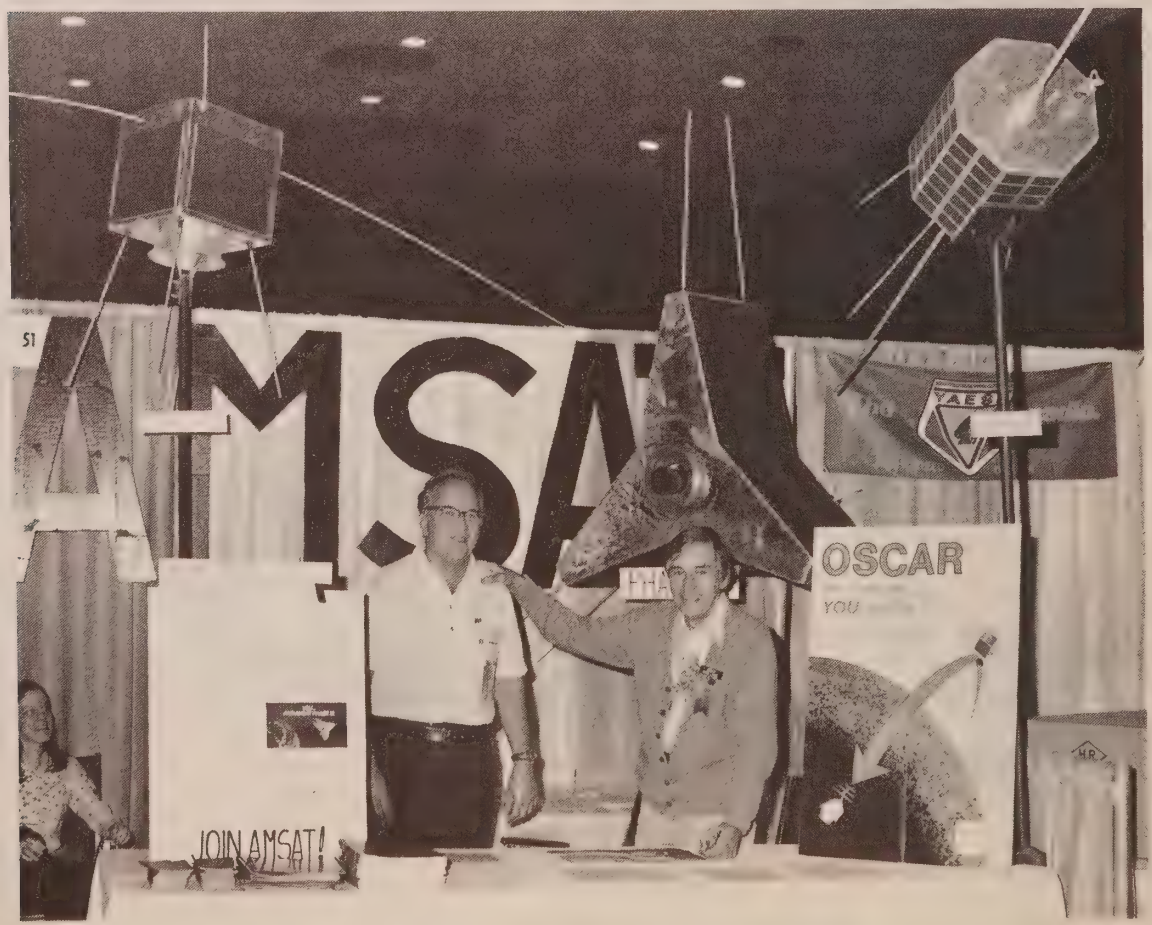
I received a "message" today (1-20-78) from Bernard Glassmeyer of the ARRL in response to a letter I wrote him reporting the reception I made of OSCAR 7 7:36 p.m. local time 1-2-78 (orbit number 14323). I was very glad to be informed that I did in fact hear and copy telemetry from OSCAR. I was also somewhat amazed at the "personal tounch" of Mr. Glassmeyer's letter. I was not expecting any such attention or recognition.

Your club and OSCAR as well as the ARRL have really sparked an interest in me to finally (after 14 years of listening) go for my HAM license. I will be taking my test within a month. I really am interested in taking part in OSCAR communications.

Thank you very much!

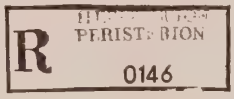
Roger Yurek





Here's $10 to buy a photovoltaic cell for OSCAR 8. I'm not a member of AMSAT and I'm not a ham, but thanks to John Foss of Sun Valley, ID, who loaned me copies of QST and HR Horizons, I learned of the successes of the OSCAR program. Great! This $10 comes from 60 pounds of aluminum I collected in the Wood River Valley, north of Ketchum.

Dusty Miller



Dear Joe:

Despite my harangue in Newsletter etc., the following stations were all on OSCAR 7 Mode "A" this evening, Wednesday, January 18, 1978, an experimental day: HB9AMO (QRO CW), SP9AOA (CW) OZ8SL (CW), DL8GZ (SSB), DC6SP (SSB), DL6XW (CW), DL9AD (CW), EA8KL (CW), GW3NIN (CW), IØUGB (SSB), SM7HBC (SSB), an unidentified RTTY station, and guess who...EI4N! He is one of your coordinators, gets the Newsletter, and we send him a free "OSCAR News" so there is no excuse whatsoever! I suggest you send him a rocket for being so b---y irresponsible. We have several EI's in AMSAT-UK who might set a better example. Grrr----!*!

73's

Pat, G3IOR

Dear Sir:

I became active on OSCAR 7, mode B, almost two years ago, using a home brew tracking system with an analog processor. The system performed beautifully and allowed me to contact about all active mode B amateurs within a few months. Then everything was just repetition and I gave up. However, with the advent of Phase III, I want to be ready for the new phase satellite as soon as it is launched.

To use my home brew analog computer which I used for satellite tracking, I needed a set of computer runs, giving me antenna direction and elevation from my QTH for all possible orbits, in intervals of 1° equator crossing. After some searching, I managed to get all the formulas and wrote the computer program that gave me the wanted printouts.

With my friend, ON5FF, we have decided to change the analog tracking system into a microprocessor tracking system, using a tape to store all tracking information for all orbits.

Yours Truly,

John A. Develdere, ON4UN
Poelstraat 215
B 9220 Merelbeke
Belgium

Dear OM:

Enclosed is my membership renewal. I have received numbers 1, 2 and 3 of the AMSAT Newsletter -- not 4. The Newsletter is important but should be thicker, longer and published more often. One criticism I have of OSCAR literature in general is the lack of good circuits for 432 MHz rigs. Some of us want better machines than a simple transverter, but even in transverters the technical data is not good. Antenna data is adequate, but here, too, much improvement would produce more and better signals on the transponder.

73 and count on my continued support.

Paul, W7QNI

AMSAT-OSCAR TOURIST OPERATION IN EUROPE

By Mike Smithwick, WA6TUF

When my father, W6JZU, suggested we take a trip to Europe, the first thought that came to mind was what OSCAR gear to take along and what rare and exotic countries I could activate for the first time (ZA? SY1?). Well, by the time we were boarding the plane, I had a brand spanking new IC-211 under my arm, an Echo 70 and 30-watt amplifier in my luggage, and a funny looking tube that looked like it could hold a four-element two-meter beam and ten-element 70-cm beam. We had licenses in most of the countries we would visit but would have to pick up the 3AØ tickets in person. In W6, Europeans were never heard on OSCAR. I had heard from G3IOR and W3IWI about the state of the European passes; actually they were far understating the truth (more on that later).

The first stops were England and Ireland. In Germany we picked up our new Mercedes 300D and were on our own. The first operation was from the home of DJ6RX on Mode A. Needless to say WA6TUF/DL was quite a popular call on the band (I once had a pileup on a DL repeater that lasted over an hour)!

The first operation from our car on Mode B using the planned setup took place in the second week (the latter part of August) in Liechtenstein as WA6TUF/HBØ. Unfortunately, it was an experiment day, but I thought that there would be a few forgetful folk on that I could work. There was an Italian and an FC6, but I could not work either. The equipment proved itself very satisfactory. In three passes, only one contact was made. In order to make the next B day from 3AØ, we spent all Thursday driving from Vaduz to Monte Carlo, about 550 miles through 5 countries (We had to go through Northern Italy, got stuck on the Italian tollways with no Lira and lost in Genoa looking for a bank at 3:00 when they all close at 2:30).

Now comes the fun! We arrived in Monaco too late to pick up the licenses for the Friday morning passes. By 11:00 the next day, we located the office. Now there was a minor problem. In order to get the tickets, we had to have a station address in Monaco which we didn't have since our hotel was about fifteen miles away. In the face of this little hitch, we told them that we were staying at the Holiday Inn. Now there was another little problem, the head of the telecommunications who signs the licenses was away and would not be in until late that afternoon and probably would not be back to sign the licenses until Monday. We were told to come back at 4:30 and something might be done. (The woman at the office could not "speaka de eenglish" so this cute blonde secretary translated for us). Well, the sightseeing took us until 5:15. When we arrived, the woman appeared a bit peeved, and was babbling incoherently mentioning Holiday Inn every couple of sentences. I gathered that she had called the hotel so we were told no address, no license. Now we had to find a hotel room in Monte Carlo at 5:15 Friday afternoon, impossible you might say, nearly so. I went back to the office as Dad walked around looking for a room for one night. Our equipment was checked over, and listed on the forms. At 5:55,(the office closed at 6:00) Dad came huffing into the office with a hotel slip. A few frantic calls later we were handed a piece of paper with the calls and told that we could operate now and pick up the licenses on Monday. Well, I was now 3AØJB and had 30 minutes until the first pass to find a place to set up. An American waiter told us of an ideal place; there was an area of landfill right on the water; it was perfectly flat, about five square acres or more. My college roommate was with us and we shortly became very proficient at setting up the antennas.

The first pass was 12716, and the first contacts were SP9DH, G3IOR, OK3CDI and DL9GSA. The next two passes netted sixteen more contacts; my goal for the weekend was to work thirty different stations.

Now I'll talk about the problems of European Mode B operation. To put it mildly, it sounded like the low end of 20 during a contest on a Sunday morning. The biggest problem was the many high power stations. Pat told me that there was one French station who uses a full EME array and a Kilowatt; many stations sounded just as bad. Next, is the problem of the large number of VHF phone only stations who don't know a dah from a dit of CW, thereby QRMing all the CW stations. I always started at 145.940 MHz, but always ended up at .930. The other problem was the many stations who worked me several times, one OK1 station kept on calling even though I told him on SSB that he was already in the log. There was also the distressing problem with the European stations not listening; the band was almost one solid CQ. Consequently, on the last overhead pass during the 20 minutes I worked only one station. No USA stations were worked because of the very high mountains that surround the country. One station was heard, and that was W1WR. I didn't quite reach my goal, only 28 different stations were worked.

Setting Up for 3AØJB OSCAR Operation

Tuesday found us at 4U1ITU. They had Mode A gear but only made a few contacts because of the high noise level on ten meters. I was told that I could operate out in the parking lot as WA6TUF/4U1. The whole area was surrounded by very tall buildings, so the passes were not very long, but I did manage 8 contacts. In between passes, I worked the 4U1ITU HF station, (I heard W2BXA on 20m but couldn't raise him to get a sked.) No USA stations were heard.

In the final operation as WA6TUF/LX, 24 different stations were worked in four passes including five US operators.

We went back to England for a day and managed to have a delightful visit with G3IOR. His wife served us authentic fish and chips as we talked about the lids on the satellite and discussed some of the problems with the G repeaters.

All in all, the operation shed a new dimension on OSCAR operation. I now know what to look forward to for Phase III.

(Continued from Page 22)

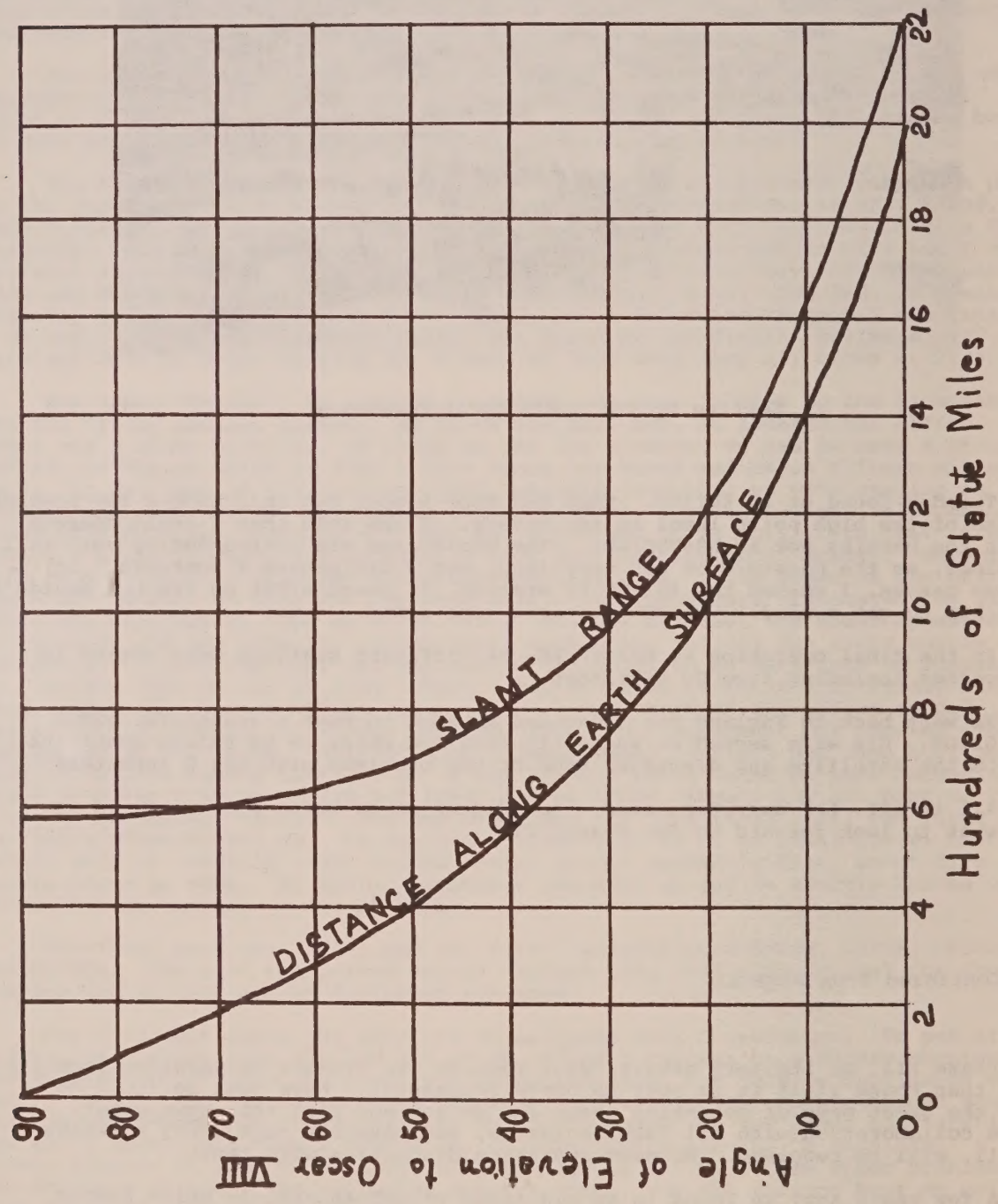
Phase III, by its very nature, will require far greater cooperation from its users than Phase II if it is ever to prove successful. Ways must be found to reach the great mass of potential users who do not now read this Newsletter. Active collaboration with all IARU Societies, and possibly regulatory agencies as well, will be required. We need operating discipline with teeth.

A few years ago, we found in an old issue of QST an article which pretty well summed up our present feelings about OSCAR and Phase III. It was called "Rotten QRM" by T.O.M. (Hiram Percy Maxim) and appeared in January, 1917. Maybe the time has come to take the Wouff Hong down from its perch on the wall in Newington and ....

AMSAT-OSCAR 8 RANGE/ELEVATION GRAPH

By Wally Lamb, WØPHD
Box 26
Warren, MN 56762

The graph below is an update for AMSAT-OSCAR 8 similar to the one that was published in Volume V #2 Newsletter, June 1973 for AMSAT-OSCAR 6.

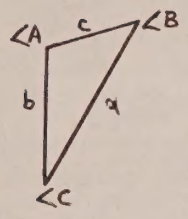


The following data were used to compute the graph

Period = 103.229 min. = P

ht = 205.82 $(P)^{2/3}$ - 3963 (earth radius in miles)

ht $\cong$ 566.5 miles



c = slant range in s. miles

A = 90° + elevation angle

b = earth radius

a = earth radius + satellite ht. in s. miles

$\angle A + \angle B + \angle C = 180^\circ$

$c^2 = a^2 + b^2 - 2ab \cos c$

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin c}$

$a > b \quad b > c \quad c > 0$

equations used

SOLVE FOR c (slant range) and $\angle c$

$\angle c$ in degrees x 69 = distance along surface in statute miles.

(Continued from Page 15)

THE RUSSIAN "RS" AMATEUR satellites are now reported due to be launched before the end of this year and are to be inserted into "High altitude" orbits.

WA3NAN, Net Control station for various AMSAT nets, is shut down while Goddard Spaceflight Center facilities are being refurbished. W1NU and others are filling in.

AMSAT's New Building at Goddard is now going forward following signing of a formal contract last week. The new AMSAT facility is to be ready in 16 weeks, in time to be dedicated at the AMSAT annual meeting at Goddard on October 14.

OSCAR 8's Orbital Data is now so refined that its change in period due to gravitational drag has been determined. The formula is $103.231836-1.117\times10^{-6}N$ where N is the orbit number, with the shift in longitude $25.80870162-2.325\times10^{-7}N^\circ$ per orbit. This calculates out to a decrease in period of about 60 microseconds per orbit or about .0001 minute per week, at which rate OSCAR 8 should fall back into the atmosphere in about 2300 years!

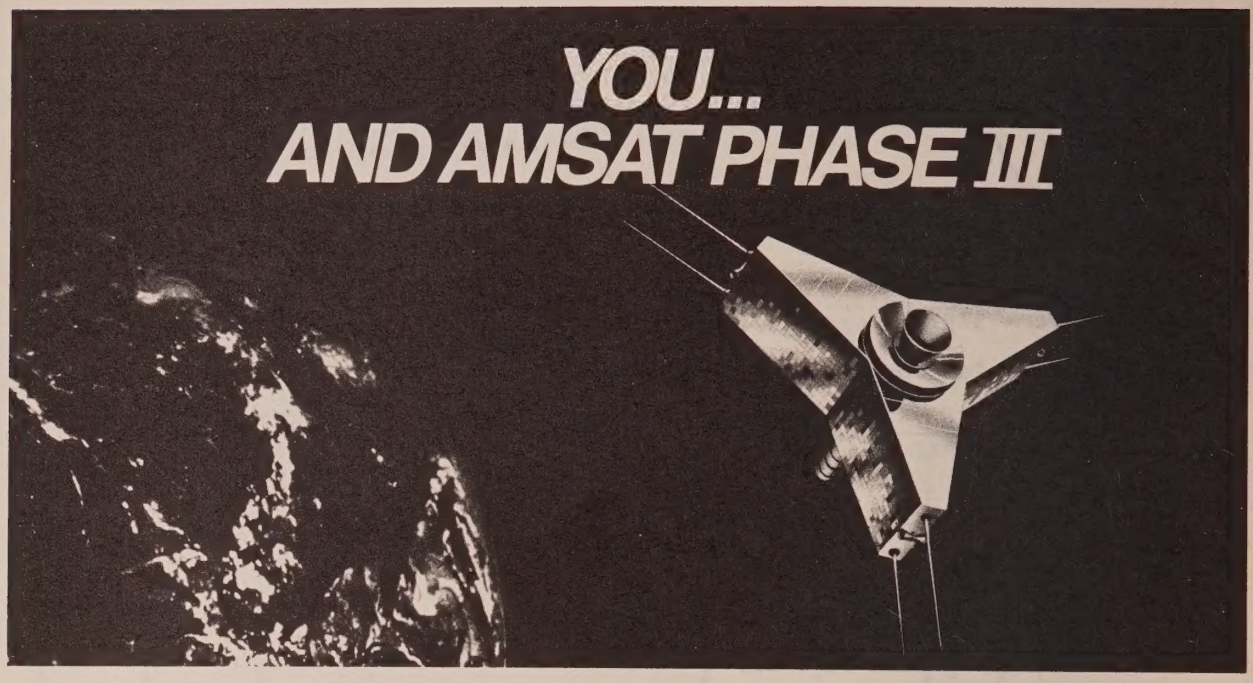
Next Week's OSCAR 8 Reference Orbits are:

Date	Orbit	Equatorial Crossing Time	Longitude	Mode
15	981	01:02Z	54.8°	A (QRP)
16	995	01:07	56.1	A
17	1009	01:12	57.4	X
18	1023	01:18	58.8	A
19	1037	01:23	60.1	A
20	1051	01:29	61.4	J
21	1065	01:34	62.7	J
22	1079	01:39	64.1	A (QRP)

G3IOR Worked Pakistan for his 103rd satellite country. JW9DM has been heard on Mode B around 145970 and is supposed to be on Mode A, active weekends only. 8P6ES has been worked on Mode A around 29485 - QSL to K4GLJ. Other Mode A catches are KG4OO on 29470, FG7XP on 29450, and OA4BR on 29450.

The publishers of "HR Report", in cooperation with AMSAT, are offering subscriptions to AMSAT members only for $17.00 per year for U.S., Canadian and Mexican members, and $33.00 per year to members overseas, including air mail. This represents a $3.00 discount from their regular rates which applies only until July 31. "HR Report's" address is Greenville, N.H. 03048, U.S.A. and they can take orders by VISA or Master Charge. Be sure to specify your AMSAT membership number and that you heard about this arrangement in the "AMSAT Newsletter".

YOU... AND AMSAT PHASE III



An exciting new era in amateur radio is about to begin... the era of AMSAT PHASE III OSCAR satellites.

The AMSAT PHASE III satellite program promises a continuing demonstration that amateur radio is at the forefront of modern technology. PHASE III satellites will routinely provide reliable communications over paths of up to 11,000 miles (17,600 km) for 17 hours each day. You can think of them as a resource equivalent to a new band.

The cost of these PHASE III satellites is a projected $250,000. Commercial satellites of similar performance would cost nearly $10,000,000.

Your help is needed to put these PHASE III OSCAR satellites in orbit.

Your valued, tax-deductible contribution can be as small as one of the 5000+ solar cells needed. A handsome certificate will acknowledge the numbered cells you sponsor for $10 each. Larger components of the satellites may also be sponsored with contribution acknowledgements ranging to a plaque carrying your name aboard the satellites. Call or write us for the opportunities available.

Your membership in AMSAT is important to the satellite program, and will give AMSAT a stronger voice in regulatory matters concerned with satellites. At $10 per year or $100 for life, you will be making a most significant contribution to the satellite program and the future of amateur radio. You will also receive the quarterly AMSAT newsletter.

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